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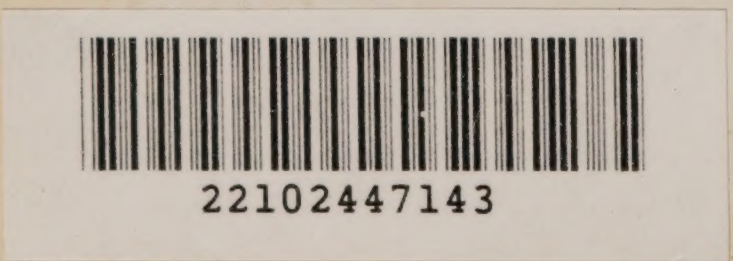
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TRANSACTIONS

OF THE

ODONTOLOGICAL SOCIETY

OF

GREAT BRITAIN.

VOLUME VII.—NEW SERIES.

LONDON:

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TRANSACTIONS

OF THE

Odontological Society of Great Britain.

VOL. VII.—NEW SERIES.

GENERAL MONTHLY MEETING.

November 2, 1874.

CHARLES VASEY, Esq., Vice-President, in the Chair.

The Minutes of the previous Meeting were read and confirmed.

The following gentlemen were nominated for the non-resident membership of the Society :—

Mr. William Merson, Bournemouth.

Mr. Andrew Wilson, Edinburgh.

Mr. G. Rhind Bull, Stafford.

Mr. Wm. Buckell, Salisbury.

Mr. John Wells, Berwick-on-Tweed.

Mr. T. Cooke Parson, Clifton, Bristol.

Mr. Henry J. Hooper, Lee, S.E., was nominated as a resident member.

Mr. Ed. P. Parkinson, late of Brighton, was recommended by the Council for honorary membership of the Society.

The following gentleman was elected as corresponding member of the Society :—

M. Ch. Darin, Meudon, France.

Mr. F. W. Murray, Dublin, was elected a non-resident member.

The following gentlemen were formally admitted members of the Society :—

Mr. M. W. Halliday, London.

Mr. J. D. Holford, London.

The following contributions to the Museum were acknowledged :—

Models and drawings illustrating his casual communication, from Mr. Ranger.

Model showing the growth of a lower wisdom tooth in a gentleman aged seventy-five, from Mr. Charles G. de Lessert, of Wolverhampton.

The following donations to the Library were acknowledged :—

French editions of Mr. Tomes's "Dental Surgery," Mr. Oakley Coles's "Dental Mechanics," Mr. Soelberg Wells's "Long, Short, and Weak Sight," Mr. Toynbee's "Aural Surgery," from the translator, Dr. Darin.

Three copies of Mr. Savory's Address, delivered at the distribution of prizes to the Students of the Dental Hospital, from an anonymous donor.

Johnston's "Dental Miscellany," from the Publisher, New York.

The Chairman.—Gentlemen : I regret exceedingly being obliged to fulfil the duties of chairman at this our first Meeting of the Session, and I am sure that regret, you will all share with me, when you hear that it is from indisposition that our able President is not here to-night. He has been ordered by his medical attendant not to expose himself to the night air at

this season of the year. I have pleasure in saying that I heard of him to-day, and I hope from what I heard that his indisposition will only be of a temporary character. I am sure you all join with me in hearty wishes for his speedy recovery.

I have also another very unhappy circumstance to refer to, and that is the indisposition and consequent absence of our Vice-President, Mr. Coleman. He has been ordered to pass the winter in a more genial clime than this, and I fear from the accounts I have heard from his relatives to-day that we can scarcely be hopeful of seeing him speedily among us. I very much fear that the arduous work he has been engaged in for the last few years, combined with that energy and earnestness of purpose that he throws into all his work, has contributed to bring him into the state of health that he is now in. I am sure that our sympathies are all with him, and we, I am sure, sincerely hope that his sojourn during the winter in a mild climate will be the means of restoring him to his ordinary health. I am sure, had our able President been here to-night, he would have congratulated you on the time that we have passed since our last Meeting, and would have expressed the hope that you were all better for your holiday and rest from duty. I hope that most of you were enabled to take a long one, combined with change of scene. One or two I know at least of us have been far from home, for I had the pleasure of meeting one gentleman, who is present to-night, in the neighbourhood of the Rhine. I hope that you have all benefited by your sojourn as much as I know that he and I have done.

We have for this evening's business no special paper. It has been supposed that occasionally a meeting would be most profitably spent in listening to Casual Communications, which, of course, are extremely interesting to us. I will first call upon Mr. Charles James Fox for his communication on a "Case of Fractured Jaw, treated with Mr. Moon's New Splint."

Mr. Fox.—Mr. Chairman and Gentlemen: The case I have to bring under your notice to-night is of so ordinary a character, that I should not have thought it worth your

attention, except in so far as it enables me to exemplify the value and utility of the simple and effective interdental splint, invented by my friend and colleague, Mr. Moon. Perhaps by my speaking of it to-night we may, in the first place, have the pleasure of gaining a few additional hints as to its use from the inventor; and in the second, others may be induced to try it in more complicated cases than it fell to my lot to treat.

The patient, John Simpson, aged 23, is an engine-fitter, and was at work on some machinery, when he was struck underneath the left angle of the jaw by a revolving wheel which had an outstanding piece of iron attached to it; the force of the blow was directed upwards and inwards from the left side—the lower jaw was fractured between the first bicuspid and canine tooth of the left side, the fracture completely separating the soft parts attached to the bone. The *left* and *smaller* fragment was drawn upwards and outwards, the *right* downwards and inwards, so that the larger fragment overlapped the smaller to the extent of half an inch, whilst it was also about half an inch lower, the left fragment being behind the right. On the morning of his admission to the Great Northern Hospital, on August 29th, the fragments were placed in apposition and supported by a gutta-percha splint moulded on the jaw, but in a few minutes the fragments were drawn out of place. The teeth were then wired together with strong silver wire, but this failed to keep the parts in good position. Pads of lint were then placed on various parts of the jaw inside the gutta-percha splint, and the four-tailed bandage applied; pieces of cork were also placed between the jaws, but nothing like direct apposition of the fragments could be maintained. On the 31st of August the fragments were drawn into the position they were in on admission and were quite separate and loose. Lonsdale's clamp was then fitted on to the jaw, but was of no use, as on the following day the position of the fragments was as bad as ever. On September 1st the four-tailed bandage was put on without any apparatus or splint, and I was applied to by letter to see the case, but unfortunately, through my absence from town, the letter did not reach me for some days. On September 7th I saw the patient, and found the two portions of the jaw pretty

firmly united in the position they were in on admission. I took impressions of the upper and lower jaw, and having cast them, proceeded in the usual way to divide the lower model at the point of fracture, articulate it to the upper model, fix it in that position, and my assistant, Mr. de Staines, then made a dental alloy plate capping all the teeth as far as the first molar on each side. On September 12th, Mr. Irving, the House Surgeon of the Great Northern Hospital, to whom I am indebted for notes of the case, having administered chloroform to the patient, Mr. Young, the temporary acting Surgeon, reseparated the fragments, and the plate being placed in the mouth I most easily and completely brought the two portions of the jaw into their place by the use of Mr. Moon's screw frame. The apparatus required to be readjusted twice during the next fortnight, because it galled the lower lip; at the end of that time, September 27th, the patient went out, having only a four-tailed bandage, but still wearing the plate. On October 1st the patient called at the Hospital to be inspected and was immediately referred to me. I found the two portions of the jaw firmly united and the arch good, but the plane of the teeth not quite so even as I could have wished, this was probably due to the necessity for readjustment. The patient, however, expresses himself fully satisfied with the result, and says he can masticate perfectly; indeed, the small separation that is observable on the right side between the upper and lower jaw is considerably less in reality than is shown in the model. I feel convinced, even from the slight experience I have had with this splint, that it will prove a valuable aid in the treatment of fractures of the lower jaw, and I feel that we are indebted to Mr. Moon not only for his ingenious though simple design, which has been well carried out by Mr. Millikin, of St. Thomas's-street, Borough, but also for his very clear and explicit account of it in the Guy's Hospital Reports.

The CHAIRMAN.—We shall be most happy to hear any remarks on the interesting case related by Mr. Fox, and especially with reference to the splint that he describes as being so useful in cases of this kind. I have seen a few cases of fracture

of the lower jaw, but I do not remember seeing one without some little displacement. Mr. Fox himself seems to be a little dissatisfied, thinking that the parts are not perfectly in apposition, but the case seems to me to have come together very nicely. We shall be glad to hear Mr. Moon's views on the subject under consideration.

Mr. Moon.—I regret not having been in the room when Mr. Fox introduced the splint to you, as I cannot now follow up his remarks, but I here show some models of cases of fractured jaw which have been treated at Guy's on different plans, thinking that some members of the Society would like to see them. I have nothing to say about the splint that Mr. Fox has introduced to your notice, except that it ought not to be called after my name, as it was in part devised by our instrument-maker at Guy's, Mr. Millikin, and I may add that it answers its purpose very well. We find its use is valuable where the tendency to displacement is very strong; the screw action on either side regulates the pressure applied, so that you can bring the fragments into position by a very gradual screw movement. I am very glad to have this opportunity of bringing before the notice of the profession the new wire splint, devised by Mr. Hammond. From the necessarily small experience that I have had with it, I think it is likely to be exceedingly useful. It is certainly rather difficult to apply, but it is particularly comfortable for the patient to wear. I have here another model representing a plan which may be called a modification of Gunning's splint. Instead of having an interdental splint capping the teeth on both jaws, a cap is made for the fractured jaw—on an amended model of course,—and this is kept in place by a wedge-shaped vulcanite cap fitting the opposite jaw. Then, a four-tail bandage being applied (as far as I am able to judge), the splint is kept on the fractured jaw as well as if the mouth were fitted with one interdental splint. Of course, there is more room for the introduction of food, and it is very much easier to apply, for occasionally there must be exceeding difficulty in putting in a splint fitting to both jaws; indeed, there is very often great difficulty in getting

the model of a badly-fractured jaw. In this case it was impossible to get any model except with a half-tray; and if you can only take a model with a half-tray, and have to make a splint fitting both jaws in one piece, the difficulty is greatly increased. The model I now show is that of a case treated with the wire splint of Mr. Hammond's devising. It was the first case we treated at Guy's on this plan, and was very successful. The wire splint being wired on after Mr. Hammond's method, kept the fragments in particularly good position, and the patient was remarkably comfortable with it. Here I have a metal cap that was kept in place by an appliance such as Mr. Fox used. The jaw, in this case, was fractured in three places. The third fracture, as I mentioned in a paper written on the subject, was unfortunately overlooked at the time. The two fractures that were covered in with the splint united perfectly, and the other fracture, where in the first instance there was the least tendency to displacement, not being covered in with the splint, did not unite, and pus formed. After the external splint had been worn for some time, it was removed, and the cap was kept on by wires passed through it and encircling the teeth on either side. We found that plan answer very well, though there is a tendency for the splint to cut the wire, unless it is very carefully done.

Mr. Francis Mason.—I take advantage of the privilege you have been good enough to accord me of considering myself a member for the evening; and with regard to the interesting case Mr. Fox has brought forward I would ask one question, whether the time occupied in effecting a cure in cases treated by Mr. Moon's method is less than that required in any other method of treatment? I have had several cases of fractured jaw under my notice. A remarkable one is now under my observation in St. Thomas's Hospital. The patient is a woman who fell from a window, a distance of fifty feet. It is astonishing that she was not killed outright. However, she had a compound fracture of the jaw, and a fracture of the sternum. When I first saw her there was immense distortion of the lower jaw; and, having heard of Mr. Moon's splint, I

said to the pupils: "Let us see what we can do without Mr. Moon's splint, for I venture to say this patient will get quite right without any splint whatever." Nothing was used except the ordinary four-tailed bandage. The accident happened five weeks ago, and the patient is now quite well. Some few years ago I saw a patient at Hounslow, who had fallen down in an epileptic fit. He was a gentleman, twenty-two years of age, and by the fall he broke his jaw in two places. There was marked displacement. I saw the patient a month or five weeks afterwards, and his jaw was as good as anybody else's. There is no doubt, when we first see patients who have fractured jaw, there is great distortion; but somehow or other the muscles seem to accommodate themselves, and ultimately the parts resume their ordinary position. I therefore beg to ask Mr. Moon, as he is present, if there is any special gain by the application of this instrument, and also whether the patient can eat fairly well while wearing it. If there are any advantages to be gained from its use, I should be the first to adopt it; but from my experience I am disposed to think that most of these cases do well when the simplest apparatus is employed. I think that this rather formidable-looking, and possibly expensive, instrument applied to the jaw of the patient, unless it has counterbalancing advantages, may possibly do harm in this way, that it may prevent the patient from taking food satisfactorily.

Mr. Fox.—I must candidly confess that having had very little experience in cases of fractured jaw, I am not in a position to reply to Mr. Mason's query as to time. This is only the second case that has fallen to my lot to treat, but the extreme facility and ease with which the fragments were passed up into the alloy plate by the screw struck me very forcibly. I may also point out that other plans had been previously tried by two very skilful young surgeons, and had not succeeded.

Mr. Moon.—Before this discussion proceeds further, permit me, Mr. Chairman, to remark that the plan of capping frac-

tured jaws has been adopted by dental surgeons of all large hospitals in London for many years past. And this apparatus that has gone by my name is simply *one* method of fixing on a cap. There are three or four other methods, each of which may be the best in a particular case.

Mr. Turner.—I have listened with considerable interest to the account of this splint, and to Mr. Mason's remarks. At a meeting of the Students' Society connected with the Dental Hospital two years ago, the subject of gun-shot wounds of the lower jaw was started for discussion. I then expressed an opinion which I had come to, after having a number of fractures of the lower jaw not directly under my care, but having assisted in treating them. I thought the cases generally could be treated without a splint successfully. I have tried splints of various kinds, and also to adjust fractures in the ordinary way, and have arrived at the conclusion that we are generally in too great a hurry in trying to do much with fractures of the lower jaw for the first few days. After the contraction of the muscles has ceased, we can bring the parts into position, and treat the cases as successfully without splints as with them. I have noticed that in some cases splints have added to the comfort of the patient when they were made so that they could be properly syringed and cleaned out; also, that the four-tailed bandage could be dispensed with for a short time now and then, giving the patient great relief; but I do not think these interdental splints have served much in the way of getting the jaw into position. The very worst case of fracture that I ever saw, in so far as muscular contraction is concerned, was that of a prize-fighter, who had a jaw of enormous dimensions, with large muscles. The muscular contraction seemed to dominate the fracture entirely for the first few days. Ultimately the contraction subsided, and the jaw was got into position by an ordinary splint, two pieces of wood having been hollowed out to receive the upper and lower teeth. Cork is generally used for this purpose; but I am afraid cork would not have had much chance in this man's mouth. We put in two pieces of

wood, one on each side. The fracture healed, and the position of the jaws is as perfect as before. I sometimes think a mistake is made in keeping the lower and the upper jaw apart too long. Cork or wood is used to keep the teeth apart. If these gags were taken away sooner, and the lower jaw brought to the upper at the expense of a little movement occasionally to the patient, we might have better results. I saw one case where a space of half an inch was left between the upper and the lower teeth. It occurred in my own private practice, and the teeth were completely brought together by the use of steady bandages. If that could be done after union has taken place, it might be much more successfully done if the gags were removed sooner, and the upper and the lower jaws brought together at an earlier period than is usual. With reference to some remarks made by Mr. Moon about the splint made to fit the upper jaw and the cap to fit the lower jaw being difficult to apply, a splint made to fit the upper jaw with the surface adapted to the teeth of the lower jaw is about the most easily applied interdental splint that I ever saw.

Mr. Moon.—I must apologize for rising again, but as Mr. Turner has said there was no difficulty in reducing a fracture, I may state that in the case I mention there were three fractures of the lower jaw, and no amount of hand-pressure would force up the anterior portion. The man was put under chloroform, but even then we could only do it with the splint and screws, though I had the advantage of able assistants. With regard to the jaws uniting without any properly made appliance to keep them steady, I may mention that on Friday last the House Surgeon at Guy's asked me to look at a case which a month before, I had been told, was doing uncommonly well; here, I may mention, that some surgeons are apt to think that dentists like to take these cases in hand, simply because they think there is "nothing like leather." Well, this case, I had been told, was going on uncommonly well. It had been treated with a gutta-percha splint moulded to the chin and the four-tailed bandage; wires were also put round the teeth on either side of the fracture—a most objectionable plan—because

part of the sockets of the teeth being already lost, wires put round the teeth tend to pull them out. Within five weeks the wire broke ; not the slightest union had taken place, and the displacement was very great indeed. I applied Hammond's wire splint made to a carefully amended model, and that immediately reduced the lateral displacement ; I could not reduce the vertical displacement entirely. I believe a certain amount of bone was thrown out, and that this stood in the way of getting the vertical displacement corrected. I shall be inclined to cut off the end of the wire splint, and to get the posterior fragment to the level of the anterior, by forcing it into position with the screw that Mr. Fox has been speaking about. I may mention that this particular case will be treated to-morrow morning in the surgery at Guy's, and that any gentlemen, wishing to convince themselves as to the degree of certainty, or rather uncertainty, that there is of union occurring in the case of a fractured jaw when treated without an interdental splint, will have an opportunity of doing so.

The CHAIRMAN then called for the next communication, entitled, "Remarks on a Case in which a portion of a Tooth was embedded in the Lower Lip," by Francis Mason, F.R.C.S., Senior Assistant-Surgeon and Lecturer on Anatomy at St. Thomas's Hospital.

Mr. MASON.—Mr. Chairman and Gentlemen : It often happens that a case of interest will be well-nigh forgotten until another presents itself which prompts us to refer to the first one. In bringing the following case before the members of the Society, I am the more induced to do so because in looking through the medical periodicals I have chanced to find a few other examples closely resembling the one I have the honour of submitting to the meeting. The case is this : A patient, aged twenty-two, applied to me in 1868 at the Westminster Hospital with a swelling of the lower lip on the left side. He had been told he had cancer, and sought advice on that account. It appeared that he had fallen from a scaffolding two months

previously, and had sustained considerable injury to his scalp and face, and his lower jaw was fractured. He had been a patient elsewhere, and stated that when he was under treatment he had fits. On examining the part the lip was found a good deal swollen, and rather tender to the touch. I made a puncture, when the knife impinged on a hard substance, which proved to be a portion of the crown of a left lateral incisor of the lower jaw, which the patient said he missed after the accident. It was decayed at the neck, and had sharp edges. The patient recovered, and was only under observation for a few days afterwards. I say I have referred to the medical journals and have found other cases; and with your permission, as they are not long, I will read the particulars of them. In the *Lancet* (May 17, 1862), reference is made to a case in which a canine tooth was found lodged in the thickness of the lower lip, simulating a cancerous tumour. "The patient was a lady, forty years of age, who had always suffered with her teeth, and had but few incisors left, the rest of the jaws presenting roots more or less firmly wedged, and the alveoli more or less decayed. Towards the end of the year 1854 she felt a small tumour forming in the lower lip of the left side, which tumour soon filled the space below the internal aspect of the lip and gum. Pain was subsequently experienced, and a few months afterwards the patient could hardly eat. She sent for M. Landyck, who discovered a large tumour situated as above, and ulcerating. Ablation was not proposed, as the lady was very nervous, and cauterization was resorted to. Whilst using the caustic some time after, M. Landyck felt a hard substance in the tumour. By then making a crucial incision, he discovered a long root of the canine tooth, covered with a thick layer of calcareous matter. It was placed horizontally, the apex turned towards the lip, and its upper part adhering to the bone. This root being removed, the tumour disappeared, and the patient was freed from all uneasiness." Another case is related in the *Lancet* (October, 1868). The patient was under the care of Mr. W. H. Folker, at the North Staffordshire Infirmary, who has

favoured me with a note respecting the man. His report is this. The patient was sixteen years of age, a joiner, and was admitted August 29, 1867, on account of a tumour existing in the substance of the upper lip. The swelling was on the right of the mesial line corresponding to the right central incisor tooth (which was noticed to be wanting), and it seemed to be formed by hypertrophied lip. It caused a good deal of deformity, as the patient was unable accurately to close his lips. The tumour felt hard, but was not painful. On carefully examining the swelling a small aperture was perceived at its base; and on passing a fine probe a hard substance was felt, which was diagnosed to be a tooth. On August 31st, an incision having been made through the tumour, a tooth was found at its base. On attempting to extract it by the forceps it was fractured; this proved to be owing to its peculiar shape, being of a crescentic form, and passing almost at right angles to the alveolus. After its removal, the swelling disappeared, and the patient was discharged on the following day. Then there is another case which I think of interest. It is one of migration of a tooth, and appeared in the *Medical Times* (April 30th, 1864), from the "Union Médicale," No. 142. "M. Delestre related to the Paris Medical Society the case of a lady upon whose palate, opposite the front large molar (which was missing), and about a centimetre from the edge of the gum was observed a small, rounded, blackened loss of substance, which seemed as if it had been punched out. Various surgeons who had seen it had regarded it as caries of the maxillary bone, and treatment had been employed in vain. M. Delestre found, on examination with a probe, that there was not the crepitation produced by contact with caries, and that a certain amount of mobility existed. Passing in a delicate forceps, to his great surprise he withdrew the fang of a tooth, about a centimetre in size, which, proceeding from the first molar, had evidently gone through the substance of the maxillary bone and become placed perpendicularly to the palate. The patient remained entirely well." Mr. Haynes Walton has reported a case in the *Medical Times* (November, 1869), of "a patient, aged thirty-five, who, three years and a half before,

had a fall, and lost his right upper lateral incisor. He had much pain, and a few weeks later an abscess formed, which discharged, through a small opening in the cheek, as well as through the alveolus of a lost tooth. Then another abscess formed, leaving a sinus open in the right cheek. On probing this a hard substance was found. The wound was opened up, and a perfect incisor tooth lying loose in the antrum was removed." I think Sir, the above cases are interesting on account of their rarity, but I bring them before the Society for another reason, namely, that a misplaced tooth, acting as a foreign body, may occasionally be the cause of very severe constitutional disorder. In the first case mentioned it will be remembered there was a history of the patient having had fits. Every member here knows that carious teeth give rise to all sorts of ailments—neuralgia, deafness, blindness, amaurosis, squint, wryneck, closure of jaws, epilepsy, &c., and in connection with these cases I venture to direct the attention of the Society to a paper read by Dr. George Johnson, at the Clinical Society, on November 8th, 1872, showing what small matters will give rise to serious nervous disturbance. The case he speaks of was one in which tetanus with facial neuralgia and palsy, and a recurrence of epilepsy, were excited by a foreign body in a wound on the cheek. The patient was a wheelwright, aged forty-four, who, on July 4th, 1872, was cut on the cheek by a blow from an iron axle that fell upon his face. The wound was strapped by a chemist, and healed, but remained very painful. On the 12th he had an epileptic fit. In early life he had been subject to epilepsy, but, until the occasion mentioned, had been free from fits for twelve years. On the morning of the 13th he had difficulty in opening his mouth. The left masseter muscle felt permanently hard and rigid. There was a scar about three-fourths of an inch long an inch below the left eye, the cicatrix being hard and very tender to the touch. Dr. Johnson believing that there was a foreign body present, directed the house surgeon to cut through the cicatrix, when a sharp, angular piece of flint, nearly as large as a grain of wheat, was discovered and removed. With this the symptoms gradually passed away.

Dr. Johnson also related another case of a similar kind. A boy, aged thirteen, was admitted for tetanic rigidity of the trunk and extremities. The symptoms, which had lasted more than a week, had commenced about ten days after a wound on the thigh by a sharp piece of wood. The wound had healed, but the cicatrix was hard and tender. The house surgeon was requested to incise the cicatrix, when a piece of woollen material about the size of a small pea was discovered and removed. Dr. Johnson remarked that the chief interest of the two cases consisted in the fact that formidable nervous symptoms were excited by the presence of a foreign body of small size beneath the cicatrix of a recently-healed wound. In conclusion, I may refer to a case which was under my care at the Westminster Hospital, when I was surgeon there, of a girl who was struck on the head by a rolling-pin, and she was admitted in consequence of having tetanic symptoms. She died of tetanus, and, after death, we found, on removing the scalp, that there was a piece of hair-pin, nearly an inch in length, which was, no doubt, the cause of the tetanus. The case is additionally interesting, because a portion of the rectus abdominis muscle had been ruptured by a tetanic spasm. One other case of some interest I may mention. It is quoted in the "British Journal of Dental Science" (vol. 5), and relates to a molar tooth found lodged in the tongue. "At the battle of Williamsburg," says the report, "a man received a bullet-wound in the lower jaw, which was shattered. After attendance at the hospital, however, the wound healed rapidly. Some weeks afterwards he again presented himself, and on examination it was discovered that a molar tooth which had been knocked out of the jaw had been buried in the tongue." I have nothing to add to the examples that you have permitted me to bring before the Society, and, in thanking you for your courteous attention, beg to ask, for my own information, if you, Sir, or any members present have met with cases in which pieces of teeth have remained for any length of time embedded in the lips, or in the cheek, or in any other part? I venture to think that we may learn one lesson, at least, from the instances I have quoted, and it is to look carefully for any

foreign body, however small, in patients who have nervous symptoms of an anomalous character.

The CHAIRMAN.—I shall be very pleased to hear the remarks of any gentleman on these interesting cases. We are apt to think that these rare cases are not so interesting as when they are more numerous, but I often sympathise with the individuals subject to them. It is just as important to them as if a hundred others were subjected to the same. I do not recollect a case myself such as those that Mr. Mason has referred to, though I have seen many cases where the teeth have developed abnormally and in unusual positions.

Mr. TURNER.—I had a case of a foreign body being embedded under the tongue of a very extraordinary nature. It was the case of a commercial traveller, sixty years of age, who had been unfit for business for a year. He was extremely emaciated, had a very anxious countenance, and had entirely lost his voice. He could not speak, but had to make his wants known by writing on a slate; and so weak was he that he could scarcely do that. He had been treated for phthisis, and then had been sent on to the hospital for cancer. He was sent to me for examination. His mouth was in the most offensive state possible. You could scarcely look into it, so offensive was the fœtor which came from it. It was as bad as any cancer case one ever saw. The tongue was raised up by a mass of soft, injected-looking tissue under it. The inner linings of the cheeks were thickened. On examining it closely I thought I saw something like a spiral spring buried in the lining of the cheek on one side, and then I felt on the other and thought I could feel something there. Of course I at once examined the roof of his mouth, and found an upper case of teeth made of vulcanite. I got this out successfully. I tied silk round the spiral springs to prevent their getting away—after getting them out of the tissue with which they were surrounded. I then got a sharp-pointed bent probe that would pierce the tissue, for I could see no opening, and it went back under the root of the tongue, where I found something hard. This I managed to remove,

after a good deal of difficulty, by cutting a way for it. The man lost a considerable quantity of blood. I found the bar of the lower plate, which had carried the spiral springs, had gradually slipped back along the floor of the mouth until it had lost itself in the tissue at the back of the tongue. In a few days the man was able to feed and to leave the hospital, and he also recovered his voice.

The CHAIRMAN.—I expect the case Mr. Turner has referred to is one that we have all had examples of, though, perhaps, not to such an extent. I have known of one or two cases of that kind, but they have been generally noticed long before they set up the mischief he has described. I should hope a lower set of teeth is not often overlooked in that way.

Mr. TURNER.—It was simply a bar passing round behind the lower teeth, and carrying the springs, not a set of teeth.

The CHAIRMAN then called upon Mr. Oakley Coles for his communications illustrating the "Treatment of Certain Deformities of the Mouth."

Mr. OAKLEY COLES.—I was asked to bring forward some casual communication to-night, or I should scarcely have intruded cases of such a simple nature as I have to show before the members of the Society. They are of some interest pathologically however, since, I believe, loss of tissue at the fore part of the mouth from syphilis is rare when taken in comparison with perforations of the soft palate or loss of tissue in the posterior part of the hard palate. In both cases brought forward we have a large portion of the anterior part of the maxilla lost through tertiary syphilis. In the one case the lower jaw was not affected at all. In this other case in which no piece is shown, the lower jaw was affected also, a very unusual circumstance, I believe. The method adopted was simply to cover the portion of the palate that remained, taking advantage of the overlap [that freely communicated between the upper margin of the portion of the palate that remained and

the floor of the nose], and using that overlap to get some fixture; the man was able to speak perfectly well, and to feed himself fairly well. He was altogether restored to a condition of much greater comfort than he had enjoyed for some time. I might state that the duplicate piece is not so light as the piece which is in wear. This has been made as light as possible, but I have not been quite so successful as in the first case. The first case was made light by carefully carving out a piece of pumice-stone to fit into the bed of the plate. It was covered all over with vulcanite, and materially lightened the piece, reducing the discomfort of having a heavy piece in the mouth.

The CHAIRMAN.—I think it is a very good idea, lightening a large mass of material like that, with the means Mr. Coles has applied in this case. We know that large masses of vulcanite are never hard in the centre, and if you happen to cut into them they are very offensive and disagreeable.

Mr. COLES.—I may add that the piece has been vulcanized for an hour and three-quarters, at a low temperature, 305°, getting up at last to 310°; and, with regard to the lightening the piece with the pumice-stone, I cannot take any credit to myself for that, I was told of it, in the first instance, by my friend, Mr. David Hepburn.

The CHAIRMAN then called upon Mr. Sewill for his communication "Upon the Use of Absolute Alcohol in Dental Operations."

Mr. SEWILL.—Mr. President, it will probably be in the recollection of the Society that two or three years ago the use of absolute alcohol was very briefly mentioned by me before this Society. Since then I have been using the alcohol, and it has been used also by a considerable number of members of this Society. In my own practice it is a necessary adjunct, and I think it is so in that of others. I feel also that if the use of absolute alcohol becomes known it will be a necessary adjunct in the

practice of most dentists ; therefore I bring it again before the Society this evening, in order that those gentlemen who have been using it may give the Society their experience. In the first place, it has always been a very desirable thing to dry cavities very thoroughly before inserting fillings ; it is a desideratum to do that, but it has not very well been carried out. Hot air syringes have been devised from time to time, but they do not appear to be very generally in use. The first use of absolute alcohol is for drying purposes. The properties of alcohol are well known. It has a great affinity for water, combining with extreme intimacy with a considerable portion of water ; and if applied to a wet surface it takes up that water, combines with it, and if exposed to the air evaporates, carrying the water with it. Absolute alcohol, owing to that property, is used a good deal in preparing microscopic preparations. Soft tissues, if immersed in absolute alcohol for a short time, and exposed to air, are thoroughly dried without injuring the tissues as they would be if they had been subjected to heat. It was these experiments which induced me to use alcohol in dental operations. In drying simple cavities all that is necessary is to exclude the saliva in the usual way, and roughly dry the cavity, and then with a small ball of lint swab out the cavity with some absolute alcohol. After a pause of a moment it can be wiped again with dry cotton wool, and another instant will allow the wet surface to dry. Of course this swabbing may be repeated. If one application of the alcohol is not thought sufficient, it may be dried and then wiped again with wet alcohol and dried again, as often as is necessary, and by that means the surface of the dentine may be thoroughly dried—not only the surface of the dentine, but any water held intrinsically by the dentine will be abstracted, to some extent at least. This treatment must evidently be desirable in all cases, and in some more than in others. In cases where oxychloride of zinc fillings have to be employed they will adhere with great tenacity to an absolutely dry surface, whereas they do not adhere at all to a surface which is wet. Then, again, softened dentine can be dried and hardened, while the patient waits, in a few minutes, by the

application and reapplication of absolute alcohol. Other uses of this fluid, of course, will suggest themselves from the remarks I have made.

There is another property which alcohol has which makes it still more valuable in dental operations, and that is, it is a very powerful antiseptic. Any animal matter treated with this spirit is rendered incapable of decay if it is sealed up from contact with the atmosphere; or if kept in the spirit or in an atmosphere of the spirit, it is incapable of decay. This property must make absolute alcohol very valuable in some operations, such as extracting nerve-pulps and filling fangs. In these cases, by the use of absolute alcohol and oxychloride of zinc fillings, we have had much greater success than we ever had in the old method of dealing with fang fillings. Under the old method of plugging roots with gold, I should think half my cases had bad symptoms; with the plan which I will now describe I have had very few failures indeed of late years. It may be exceptional, and may be simply a run of circumstances, but certainly the cases I have treated since the absolute alcohol has been used have been much more successful than before. The way I treat these cases is to clear out the dead pulps as thoroughly as I can. I do not broach the roots at all, because I think it is very difficult in many cases to know the exact direction of roots, and to know whether we were not perforating the roots, or whether we have not pushed our instrument through the apex into the alveolus. I therefore do not enlarge the canals, but pass in cotton wool saturated with absolute alcohol; by that means any small shreds of tissue which remain will be dried up, and rendered incapable of decay. Then, after pausing to allow the alcohol to evaporate, I pump into the root canal liquid oxychloride of zinc, with a few filaments of cotton wool, enough to force it into the root. This is, perhaps, the operation for which absolute alcohol is most useful. With your permission I will read some remarks which Mr. Fletcher has sent to be read as his contribution to the discussion :—

On Drying Cavities in the Mouth.

By Thomas Fletcher, Esq., F.C.S.

The use of absolute alcohol for drying cavities I am disposed to think is a mistake, except under special conditions, and I believe you will find it fail to produce, in every case, that absolutely perfect contact with the walls which undoubtedly can be produced with an amalgam in practice.

The failures may be looked for when very soft amalgams are used in cavities which contain partially softened dentine, and the cause I believe will be the following. Absolute alcohol, in its drying power is, so far as my experience goes, very deceptive. It takes up water with avidity, but at the same time becomes less volatile, and does not leave a really dry surface. This I think may be proved by the fact that an adhesive gold plug which has become accidentally wet in packing cannot be sufficiently dried by absolute alcohol to become again adhesive, whilst chloroform dries the surface sufficiently well to restore the adhesiveness, to a very great extent, if not entirely.

It must also be remembered that the whole of the tooth substance is soaked with moisture, and the drying of the surface, even if effected, is only a very temporary remedy, and that the dry part is again penetrated before any amalgam (perhaps with the exception of palladium) has time to become hard and safe.

What is required is, to prevent the possibility, under any circumstances, of contact or communication between the moisture in the tooth and the saliva, and I believe this is to be obtained only by varnishing. The difficulty with a varnish is to get one which will hold to a wet surface and yet keep moisture on one side of it.

After a long series of experiments in and out of the mouth I am disposed to give the preference to resinous varnishes containing a large proportion of carbolic acid; without the latter the varnish is liable to part from a wet surface and to fail in practice. Where the cavity can be fairly dried I should take, in preference to anything, a thin solution of gum copal in ether; if this can be fairly applied the cavity is as safe and tight as one of glass, and the same theoretical perfection can be obtained

in one cavity as the other. I note where this varnish has been used a marked and total absence of discoloration of tooth substance in every case.

Absolute alcohol will no doubt succeed with a dry, hard amalgam which sets quickly, and which has been thoroughly condensed so as to be fairly hard before it is left; but this is simply because a hard amalgam, practically free from shrinkage, has little tendency to give way to capillary force if once properly in contact with the walls of the cavity. This you will see practically demonstrated in the experiments detailed in the *Dental Journal* for August last.

In conjunction with Mr. Clare I have been watching and testing every material and process with regard to filling materials which have been mentioned or referred to in any way (taking into consideration at the same time the very important fact that no hard and fast law or rule is ever strictly adhered to in practice by any number of operators), and in testing theoretically the use of absolute alcohol, as suggested by Mr. Sewill some time ago, I formed the opinion of it as stated, and am disposed to believe that the objection mentioned will be found in practice; that it is, in fact, simply an improvement without being a certain remedy for what I have no doubt is *the* cause above all others of the failure of amalgams in the mouth.

At the same time I am prepared to admit that any one like myself who has only a very limited experience in the mouth is liable to error in many ways, as the whole conditions of the mouth cannot be fairly judged by theoretical tests.

Mr. Oakley Coles.—I should not like the opportunity to pass without testifying, from my own personal experience, to the value of the suggestion of Mr. Sewill, as to the use of absolute alcohol. At the time Mr. Sewill first brought it under the notice of the Profession, from the fact of my being a near neighbour of his, we talked over the subject, and I have been in the habit of constantly using it, and always with most satisfactory results. It is especially useful in those cases where you get a large cavity with a mass of

softened dentine that is exquisitely sensitive to the touch of the excavator. By saturating the dentine with the alcohol you gradually dry it, and are enabled to cut away the dentine with comparatively little pain and discomfort to the patient; and certainly, in those cases where having excavated a cavity before beginning to plug you find certain points very sensitive, I am quite sure you may deaden the sensibility of the dentine by two or three applications of absolute alcohol. How it acts I am not in a position to say. I do not know that we can determine absolutely how it acts, except it be by producing constriction of the contents of the open ends of the dentinal tubes, or causing them to contract within, so that nothing comes in contact with them. All that is hypothetical, however, and I should not be prepared to put it forward as an explanation. That is the only way in which I can possibly account for the fact. I can certainly state it as a fact, from very considerable experience in the ordinary cases of drying out before inserting a filling. I can recommend it to those who have not tried it, as yet, with very great confidence.

Mr. Tomes.—Not having had much experience with absolute alcohol, I am not able to speak upon its value with any degree of certainty. I have, however, been in the habit of using sal volatile for much the same purpose. When placed in a tooth it will not so much assist you in drying it, though it will do that to some extent, but it will almost at once act upon the softened dentine, and cause it to become brown. Certainly the cavity will dry more rapidly after you wipe it well out with sal-volatile than it would have done had you merely wiped it out with water.

Mr. Turner.—I feel greatly indebted to Mr. Sewill for having suggested to me the use of absolute alcohol, for I was never able to get a cavity so clean-looking, so satisfactory in every way as I have been since I used alcohol. I have used prepared cotton wool, I have used the sponge used in America —a most excellent material for taking up moisture,—but, as Mr. Sewill says, the alcohol seems to withdraw the moisture

from the substance to a certain extent; and with the use of alcohol you get the cavity in a satisfactory condition. I do not think you get the cavity in a good condition if you allow the saliva to reach it.

Mr. Sewill.—I would reply first to Mr. Fletcher. He writes about amalgam plugs. Amalgam plugs are not the only plugs we use, therefore his remarks do not apply to other fillings. Then he writes:—"Chloroform is more effectual in drying adhesive gold than absolute alcohol." When I commenced experimenting with absolute alcohol I tried chloroform. It is simply the fact that it is less effectual to wipe a wet surface with chloroform than it is to wipe a wet surface with dry cotton-wool. Chloroform has no affinity for water; it is with great difficulty you can mix chloroform with water; therefore to wipe any wet surface with chloroform is useless: the chloroform evaporates itself, but does not carry the fluid with it. Certainly in my experience absolute alcohol renders a wet adhesive gold surface more amenable to after-treatment, but it is never very effectual to add adhesive gold to a surface which has been wet with saliva. That may be accounted for in other ways besides the actual presence of water. The water flowing over the adhesive gold may alter its molecular condition, or a minute quantity of foreign matter which it holds in solution may be deposited on the surface of the gold, and that would be quite sufficient to prevent union. I think probably that would be the explanation. Then Mr. Fletcher says that the dentine would become permeated with water again if it had been treated with absolute alcohol. I do not think that will take place if you have a margin of sound tissue, and the plug is tight at the orifice, the water cannot penetrate to the dentine beneath, and it certainly could not pass upwards from the pulp. In most cases of caries we have some consolidation of fibrillæ in the dentinal tubes to prevent the water passing. Mr. Fletcher goes on to speak of a lining of varnish in cavities. This appears to me to be not very good in theory. Any varnish that can be applied is liable to decomposition. If you plug a varnished cavity with

amalgam, the amalgam shrinks to some small extent; and you simply get the shrinkage, *plus* a lining of something which will decompose. That would not be very effectual unless some varnish would penetrate the dentine, and I do not think any varnish would do that. Mr. Coles made some remarks on the subject of sensitive dentine. That is a point I have noticed, and which we might be prepared for. Spirit has always been in use for treating sensitive dentine, and I think it can be accounted for by the action of the absolute alcohol on the contents of the dentinal fibrils. Those are the seat of sensation, and they are capable of being acted upon by spirit; they can be devitalized, shrivelled up and dried on the surface by the absolute alcohol. Mr. Tomes mentioned that sal-volatile has the property of turning decomposing dentine brown. This property is also manifested by absolute alcohol; the sound dentine becomes bleached, and the brown dentine becomes intensified by the absolute alcohol. I may add that absolute alcohol is a common article of commerce, and is to be had of all druggists.

Mr. RANGER.—I have a case or two to bring before your notice that occurred at St. Thomas's Hospital. The first was rather unusual and remarkable from the fact that so little discomfort and distortion should have occurred considering the injury. A boy, about nine years of age, came to the hospital in March, 1871, complaining of pain in the central incisor tooth. The tooth was necrosed and loosened in the socket, with a good deal of swelling over the fang. I removed the tooth, and found a brass pin projecting from the apex of the

Fig. 1.

Fig. 2.

fang half an inch (Fig. 1). The pin was impacted in the pulp cavity by means of a piece of wood and the point of a slate pencil (Fig. 2). The boy, who was rather stupid, could give no

account of the injury, and said he had no idea he had ever placed a pin there. The next case is one of dilaceration, which also occurred in the hospital. The patient was a girl nine years of age. That is a model of the mouth, and here is a specimen

Fig. 3.

Fig. 4.

(Fig. 3) of the tooth itself. It was bent completely at right angles, and there is a good deal of thickening of enamel round the seat of the injury. The fang is very fairly formed, but it juts out posteriorly at neck in rather a remarkable manner, and seems to stand away from the remaining portion of the tooth. The pulp cavity is continuous from the fang to the cusp.

The other case is somewhat similar, but it is a lower central incisor (Fig. 4), taken from a boy about eight years of age, also treated at St. Thomas's. It is a case of inter-alveolar fracture, which has been united by cementum. There was an immense amount of displacement, and the fang is rather abortive. There is an expansion of the fang at the point of union, with two peculiar nodules of enamel on it. The pulp cavity in this case is not continuous, so that I should rather prefer to call it a case of united inter-alveolar fracture. The upper model has also an incisor, bent at an angle. I have not extracted it, but it cannot be due to the malformation of the lower tooth. I think there was some account of an injury; the child fell down stairs at an early age. The cases are rather rare; we have only met with these two cases in St. Thomas's during the last ten years.

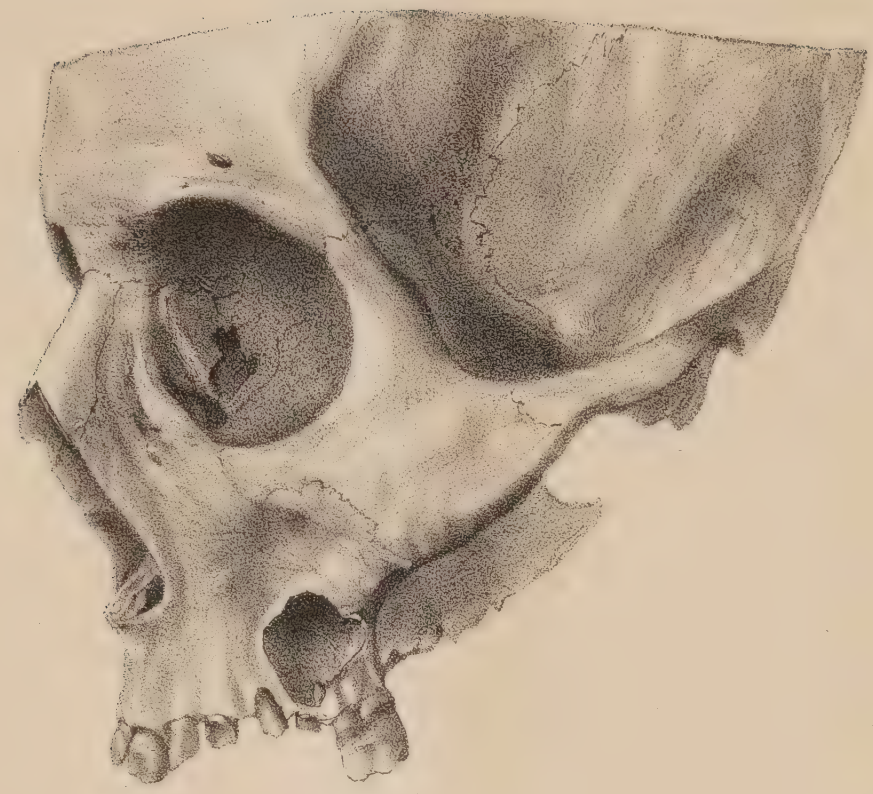
Mr. G. Henry.—It might not be foreign to the subject to advert to a small accident that occurred to myself a few weeks since. I discovered a little tartar on my lower teeth, and

thought I would remove it. Being a little too vigorous, I must have fractured a small portion of the alveolus at the neck of the left lateral incisor. This set up considerable irritation, though I was quite unconscious of the cause of my trouble. Gradually the swelling travelled lower and lower towards the apex of the fang, where it pointed, and matter was discharged. Two or three days afterwards I felt a little hard point in the gum, but did not give much thought to it, and in the course of the day the little piece worked out. I felt it between the lip and the gum, and it proved to be a very small portion of the alveolus, which I must, in my vigour to relieve myself, have chipped off. It shows how an unforeseen accident may happen, and a foreign substance set up considerable irritation. I was very nearly sacrificing my tooth, but now it is as sound as the rest.

The Chairman.—We have now to thank the donors who have so kindly contributed to the Library, and also those gentlemen who have contributed communications, and have taken part in the interesting discussions.

The Chairman then invited the attention of the members to some burring engines by both Morrison and White, exhibited by Mr. G. Rutterford, and the meeting was then adjourned to the first Monday in December.

1.



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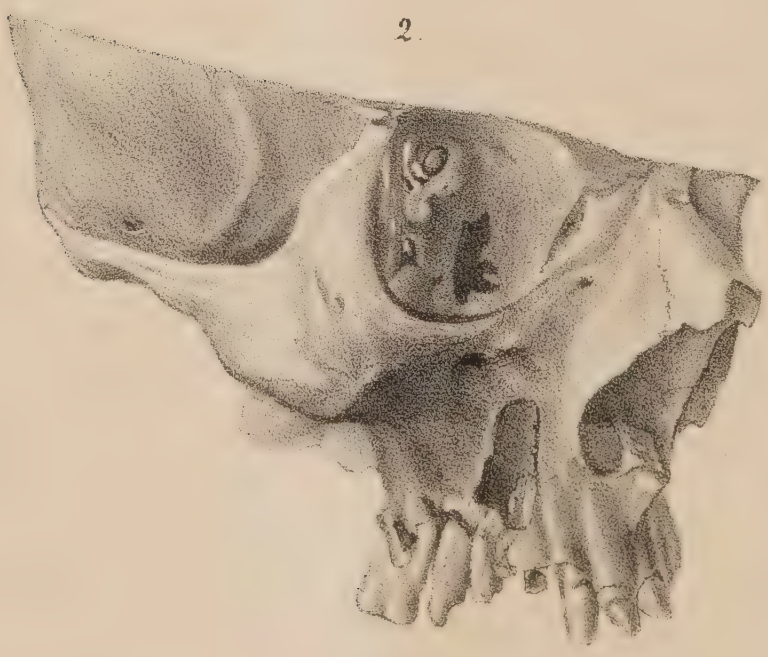

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PATHOLOGICAL SERIES.

Plate VIII.

ALVEOLAR ABSCESS.

Figs. 1 and 2.

In the two specimens figured the bone has been excavated to a considerable extent by alveolar abscesses; though it is probable that, did the opportunity for examination offer itself, excavation to this extent would be found to occur frequently in cases of no unusual severity—the writer having several times been surprised at the size of the cavity revealed by probing the socket of a freshly-extracted tooth, to the apex of which fragments of an abscess had been attached.

Another feature of interest is, that notwithstanding the size of the cavities, and their situation, in neither case was any communication with the antrum established; the specimens, therefore, have a practical import, as it would have been quite possible to fall into the mistake of supposing that the antrum was opened, had the operator become aware of the existence of so large a vacuity above the tooth in this position.

GENERAL MONTHLY MEETING.

December 7, 1874.

CHARLES VASEY, Esq., Vice-President, in the Chair.

The Minutes of the previous Meeting were read and confirmed.

Mr. S. J. Hutchinson, 41, Brook-street, W., was elected a resident member; and

Mr. Whittingham, Hanley, Staffordshire, a non-resident member.

The Chairman then called upon—

Mr. Moon, who said the communication I have to make to the Society this evening is of a very trifling nature, and I must almost apologise for bringing it before your notice. This small instrument is a tape-carrier, made by Messrs. Ash, to meet a want which I met with in practice. The tape being put into the slits of the instrument, the forks of the instrument are extended, and the tape is made taut by pressing down the wedge. The curve of the instrument adapts it for operating on the upper or lower teeth. As an after-thought it was suggested that the same instrument would carry a finishing-file, and I think it will be found useful in bringing to bear the finest flexible finishing files on gold stoppings at the back of the mouth. The polishing surface of the tape can be turned to the front or the back, so as to reach either a mesial or dietal surface.

The Chairman.—Would the point of the file be held sufficiently tight?

Mr. Moon.—I think so. Very probably an alteration might be made in the instrument with advantage to adapt it for carrying the file. The great difficulty is that the files break, especially in frosty weather. For the tape it is very useful.

The CHAIRMAN.—We had an improved burring engine shown on the last occasion by Mr. Rutterford, also a repeating stopper. We shall be glad to hear remarks upon that subject.

Mr. CHARLES TOMES.—I have had this "S. S. White" engine in use about three months. One of the first ones sold was sent over to me as a present from one of my friends in America, and I have used it now for a sufficient length of time to be in a position to speak as to its qualities. I think, on the whole, I like it better than the Morrison engine, though I do not know that there is any very great difference in the two. The right-angle attachment which belongs to it I have not seen, and it is very commonly not sold with it; but with that exception I think that this is rather the nicer instrument of the two. There is nothing you can do with this instrument that you cannot do with the Morrison; but the flexibility is, at least, as great, if not greater. It works quite as steadily, and the manner of fastening the point is, I think, perfect; seeing that the whole fastening revolves, there is no possibility of its wearing out or ever getting any worse than it is to start with. For using the corundum discs, or any point which you wish to use with a drawing cut towards you, I think that this engine is the best, the fastening of the point is so absolutely secure.

Mr. SEWILL.—I should like to ask whether any member has devised a means of overcoming the difficulty with the right-angle attachment—the unscrewing of the end-piece? I believe that is the difficulty that renders the right-angle attachment much less useful than it would be.

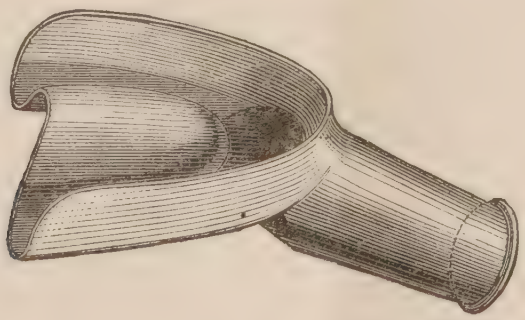
Mr. HANKINS.—I was this evening at Messrs. Ash's, consulting them about the right-angle attachment, and the difficulty of unscrewing the rose drill after the use of it. Inserting the rose-drill in the right-angle attachment is easily done; but if you drill a tooth with it, at the end of the operation you find a difficulty in removing it. Mr. Ash's assistants told me they thought that nothing could be done but to invent a new instrument altogether for the right-angle attachment. If you are busy and want to use a larger drill,

you will find a great difficulty in removing the one you have just used. It is firmly fixed, and you cannot possibly get it out. It seems to me the only thing is to have some entirely new instrument.

The CHAIRMAN.—I am sorry to hear that, because I considered the right-angle attachment the most important part.

Mr. HANKINS.—The more you use it the tighter it becomes.

Mr. TURNER.—I wish to say a few words about two models which I shall hand to the President. These two models I may say practically have been taken in plaster. One of these impressions has long teeth isolated; and the amount of fracture in the plaster is marked by ink on the model. The rest of the mould was taken from the mouth, as you will see it there, cast in plaster, without any fracture or damage whatever. The impression was taken without any plaster escaping into the mouth; and I think that any such impression may be taken in the same way by the use of the system I am about to introduce to you. In the first instance, I alter the usual form of the tray which we use for taking impressions. I make the handle of the tray into a funnel, which opens on to the palate of the tray, and the upper boundary of it is formed by the lower part of the anterior wall of the impression-tray. The outer end of the handle is widened considerably, and it has a lip soldered round its outer free margin. On a tray constructed in this manner, as shown in the subjoined engraving,



I put a wall of wax round the whole of the outer margin, and also across the margin of the palate, and with this take an impression of the whole outer circumference of the

mouth. Here is a tray with the wax put on it, prepared for taking that small model which is there with the long teeth upon it. There are several deficiencies on the model for which that tray is prepared. It is there with the lateral and front tooth gone, in distinction to the other, which has only one or two teeth on each side deficient. To the outer end of the funnel I fix a piece of sausage-skin. The wax is cut away wherever I want the plaster to come, consequently I get the front of the teeth in wax, the upper parts of the gum in wax, and wherever the plaster is not to go is taken in wax. Where I want the plaster to go is where I want to fit my plate; the plaster cannot go anywhere else. When I have prepared the wax in that manner and made ducts by which the air can pass out, I return the tray to the mouth and see that it goes into its place again. I then withdraw it, oil the inside of the funnel, pouring the plaster into the bladder by the palate-opening, and return the tray to the mouth and inject the plaster into the space which I have made in the impression by cutting away the wax. I know that there is a mode of taking plaster impressions where you make a trough of a wax mould that you have previously taken; but when you return that mould to the mouth with the plaster in it, you have no control over the plaster; it goes where it likes; and you have consequently a number of fractures when you withdraw the mould. The plaster is sometimes so thin that you have great difficulty in putting your pieces together. Generally in taking impressions of dentulous cases you require a model on which to mount your teeth and another to fix your piece. With this mould I think you can get a model which will enable you to mount your teeth and fit your plate at once, and you can get it without the plaster escaping into the patient's mouth, and you can get a model with few or no fractures. If you have a fracture or two, the plaster is so thick that you can easily put it together again. You will see by the model that this plan has capabilities which remain, I think, to be developed. I do not say I have introduced it in a perfect state. It is perhaps more suggestive than anything else, but at present I can use it with considerable advantage.

The CHAIRMAN.—There is no more important subject than this of plaster casts of the mouth, and I hope Mr. Turner's tray will give rise to some remarks upon the subject; for plaster casts are so immeasurably superior to any other casts we get of the mouth, and the difficulty of taking them is so very considerable where there are many teeth still remaining in the jaw, that any help or assistance to casting in plaster is really very valuable to us.

Mr. TURNER, in reply to some remarks from Mr. Underwood, said, it is because I believe plaster casts are immensely useful that I have taken the trouble to work out the system I have introduced to you to-night. We, who are in the habit of taking plaster impressions of these dental cases, find that the more we get the plaster impressions the more we like them. The model to which the last speaker alluded was taken in plaster mixed with tepid water. In carrying out this system, I found that any saline hardening medium produced so much cold that the patients objected to the rush of cold placed upon their teeth. I therefore used tepid water. I do not know how long the plaster took to harden in the mouth on the occasion of that model being taken. A great deal would depend upon the heat of the water; and I am guided by the hardening of the plaster in the basin as to the time at which I would withdraw the model. I treat it entirely as I would any other plaster model, and withdraw it when the plaster in the basin has become what we call nearly set, that is, friable when a certain amount of force is applied to it—not so hard as it would be twenty minutes after being mixed up. From four to five minutes is, I think, about the average time with the plaster we use in our work-rooms. It is too long, I know; and we ought to have some quick-setting plaster; but the difficulty in getting quick-setting plaster is to keep it at its quick-setting pitch. We are not always taking impressions. We may not require plaster for days or weeks together; and consequently it is a very different sort of plaster from what it was when we opened the bag. I have suggested to some of the depôt people that they should make up some small

packets of quick-setting plaster, about enough to take one impression in each packet, and sell them at so much per dozen. We could then open a packet when we wanted it, and always be sure of the same results.

Dr. MURIE.—I have had some experience in plaster, but not in plaster impressions of teeth. My friend Mr. Turner has said one or two things which seem to me as if he was really ignorant of the effects of plaster. I will tell you what I know of it, and he can compare his knowledge with mine. I do not know where dentists ordinarily get their plaster; whether it is from some of the Italian warehouses, or whether you have any special sort for dentistry; but I have found that there are varieties in plaster. With regard to its setting, there is one statement Mr. Turner made which has very much surprised me,—that is, that adding hot water makes a difference to adding cold water. It seems to me, in the action of plaster the first thing that takes place is the production of great heat, and if you put your hand into a dish of plaster with cold water, you will find heat rises very considerably; therefore, what benefit hot water can be I cannot conceive, further than it may make the patient satisfied, which, of course, is a great object. I have used plaster a great deal for injecting. With regard to the quick setting, that depends upon the amount of water you add to the plaster. To do an injection with plaster, you require to make it as moist as you are able, if you wish it to retain its consistency long; but, of course, if you add too much water it will not set. Applying my experience from another side of the question to what Mr. Turner has said, I would say it altogether depends upon the amount of water. If you wish a quick-setting plaster, the thing is to have a small amount of water, and to add it in small quantities.

Mr. CHARTERS WHITE.—I have found in practice that a little tepid water does make plaster of Paris set much more rapidly than when the water is used cold. For a long time, when I required plaster of Paris to set quickly, I have not used any salt or alum, but have simply mixed with the plaster a little

scraping of some old model, which makes it set very rapidly indeed, and without the cold Mr. Turner spoke of, as generated by the salt and water. There is no doubt, if we can use plaster of Paris, it is a very valuable medium for taking impressions, on account of its not displacing any of the soft tissues of the mouth. But, on the other hand, it is only men like Mr. Turner and others who have been successful with it, who can make a good impression with it. It is very awkward to handle, runs about the mouth, and sometimes patients want to swallow in the middle of the operation. To supersede that difficulty, I have taken impressions in soft wax, keeping it in the mouth until it has set. In that way I have been able to avoid the displacement of soft tissues, and to withdraw my impression from the mouth without getting anything of a drag or the disagreeable breakages which follow the use of plaster.

Mr. Sewill.—I have used plaster of Paris throughout the whole period that I have been in practice. Mr. Sercombe was my instructor, and in his practice and hands I saw such valuable results that I myself at once commenced to use it. I am quite certain, from my experience, the difficulties of using plaster of Paris are very greatly exaggerated. I do not say that those who have experience exaggerate, but I mean the imaginary difficulties are great. In a large number of cases a plaster model can be taken in the ordinary tray if you have a patient who is docile, as most patients are. I do not find any difficulty in getting plaster to set rapidly. I get the finest plaster of Paris supplied to dentists. With that I mix a small quantity of salt, and use warm water. The average time of setting is about two minutes. There is another advantage in plaster, that you need not wait until it is absolutely hard, but may deliberately break most of your impressions without doing any harm. If you have under-cut teeth, you may simply, when the plaster has reached a certain degree of hardness, pull out your model or deliberately bend it in some way; then pull away a part of your impression, leaving a certain amount of it detached pieces, which when hard can be fitted into their places. The case of

a restless patient can be overcome by making a special tray to fit the mouth closely, and with that you may use the thinnest film of plaster. Patients who will not tolerate a mouthful of wax or composition will bear that perfectly; they are hardly conscious anything is there but the thin tin plate. With regard to cleft-palate cases, it is utterly unjustifiable to make an obdurator to any model except one taken with soft plaster, and in such cases the difficulties of taking models in plaster are a little more formidable in imagination than in practice. I have taken a considerable number of these impressions simply by first taking a wax model; then by making a zinc plate to fit the palate to the edges of the cleft; loading that plate with plaster heaped upon it and passing it into the cleft, allowing it to remain until the plaster has set,—not hard,—and then deliberately breaking that: in that way you get out the model of the palate to the line of the cleft. In the cleft you leave a mass of plaster extending back into the soft palate, and that in many cases you can simply push back into the pharynx and withdraw with a pair of tweezers. The difficulties of taking these plaster impressions I am quite certain can be easily overcome, and if any one commences to use plaster he will certainly use it in more than half his cases.

Mr. Harding.—Some three years ago or more plaster was introduced at one of the meetings, and it was understood the reason it was not more generally used was that there was an immense amount of difficulty in using it. From that time I resolved to try hard and overcome that difficulty, and took most of my models in plaster, and got a very fair result. Very shortly afterwards the Godiva cement was introduced, and I am quite certain if that Godiva cement is used as carefully as plaster is, kept in as long and allowed to set as hard, it is a much more pleasant thing to use; it does not give the same trouble either to the dental surgeon or the patient, and you may get the same satisfactory results. I can quite confirm what Mr. Turner said just now as to warm water. I found warm water was the best medium to make plaster set quickly.

Mr. HEPBURN.—The tray contrived by Mr. Turner is not only very ingenious, but practically a very useful method of taking plaster casts. The great difficulty we have hitherto had in taking plaster impressions is the escape of overplus plaster into the interstices between the teeth and other parts of the mouth, which, in many cases, completely spoils the model. This tray, fitted to the casts now exhibited, with the wax around the outer edge, shows how completely the plaster is prevented from escaping, but the special utility of this improvement is the hollow handle with the flexible skin by means of which the exact quantity of plaster required is injected into the tray. As I said, this invention is an exceedingly useful one, and Mr. Turner deserves praise for the modest manner in which he has brought it forward, as a suggestive idea to be further improved on.

Mr. F. HENRY.—As to the amount of water which should be mixed with the plaster, I believe it is generally known that there is a very simple rule to go by, and that is to lightly sprinkle the plaster into water; the plaster gravitating to the bottom, takes up only a certain quantity. I am under the impression that this is generally known, and should not have referred to it but for what has been said about pouring the water on to the plaster, which I should say is a mistake, and is likely to cause lumping.

Mr. CHARLES TOMES.—Mr. Turner's tray seems adapted to greatly facilitate the use of plaster in difficult cases; but if in taking our impressions with Stent or Godiva compositions we use our watches, and really keep it in for a certain time, we shall find the necessity for the use of plaster limited to a very much smaller number of cases. Three minutes seem a very long time. You will be surprised, if you take to timing your impressions, what a long time it seems.

Mr. TURNER.—This discussion has assumed dimensions which I never anticipated. The question of plastic material for taking impressions, the mode of working plaster, and the time it

takes to harden, are all things about which I might have spoken had I been reading a paper upon taking plaster impressions. What I introduced was this system of simplifying the process of taking plaster impressions in cases where teeth remain in the mouth. You can get an impression in an ordinary plaster tray, but if the teeth be long and narrow at the neck you have to chisel that plaster out of the mouth, and put it together again as you would a child's puzzle, though not so easily. Even then you would find that little bits were deficient, and those who have tried it must be aware that it is a very disagreeable process to which the patient has to submit. It was to avoid this that I introduced this system, and also to avoid the plaster getting over the edge of the tray into the mouth down on to the dorsum of the tongue, inducing restiveness, if not something more, in the patients, when you want them to be steady. I must thank Mr. Hepburn for the clear and decided way in which he has appreciated my object. I do not wish to discuss anything about the merits of plaster models or Godiva, though they were all present in my mind when I was working out this system. I wished to confine myself to the matter in hand, namely, an improved method of taking plaster impressions in dentulous cases. My object is to make such cases without using bands. I do not think we can do that to the same extent in using either wax, Stent's, or Godiva, wax mixed with resin, or any of the plastic materials that are in use. With a good impression in plaster, you can make a plate for a model with a variety of teeth scattered all over the mouth without bands being used to hold it up in its place.

The CHAIRMAN then called upon Mr. Tomes for his casual communication :—

Mr. CHARLES TOMES.—My communication is simply to exhibit some of the things which have been lately presented to the Museum. There are some sent by Mr. Rose, which are of considerable interest; one, a specimen of a small supernumerary tooth between the fangs of a lower molar; and as a companion to that specimen there is another sent by

Mr. Henry, of an upper molar tooth, the inner surface of the fangs of which show facets, which have obviously been in contact with some hard body or other. There are some specimens of ordinary exanthematous necrosis in a young child, bringing away the crypts of the permanent teeth, presented by Mr. Rose.

The sequestrum from a case of necrosis, also presented by Mr. Rose, involving the lingual walls of the alveoli of the front teeth, forming a scale of bone all round the lower maxilla. The note appended to the case is, that the teeth entirely regained their firmness.

Then we have an example of necrosis of the socket of a perfectly sound tooth, an incisor, with which we have no history; and an interesting specimen of a very large accumulation of tartar round an upper molar presented by Mr. Bridgman. Then there are some specimens of teeth united with one another, not of any unusual interest. Mr. Rose has also sent us the crowns of two bicuspids from a region in a child's mouth where there had been alveolar abscess existing for a length of time; the crowns are excessively stunted and malformed in consequence.

Mr. G. Henry.—With regard to the specimen I had the pleasure of sending, I hoped it might serve as an illustration to the paper Mr. Tomes has promised us this evening; but he informed me it was a little foreign to the subject. I will just read a short description of the tooth. "It was a first upper molar, extracted from a labouring man some years ago, and before the particularity of the roots was noticed the patient had left, and was never seen again; I regret, therefore, not being able to contribute any history of the case. Saucer-shaped cemental depressions are seen on the inner surfaces of the three fangs, which must have embraced some lobular development, suggestive of either a large dental exostosis, or possibly an odontome. The posterior buccal fang seems to have been more intimately connected with the growth than the other two fangs, which appear to me to present fractured surfaces of cementum only; but I could not be certain that

the dentine is involved in the former without the aid of the microscope, and I have thought it wiser to preserve the specimen intact." I cannot throw any light upon it. It only shows how wise it is to examine teeth directly after you have extracted them. In the pressure of business the specimen was overlooked, and, in fact, nearly thrown away. If it could have been followed up, no doubt it would have been a very interesting case.

The CHAIRMAN.—Mr. Tomes has certainly brought before us a number of interesting cases; and the example that he has sent round, of an accumulation of tartar, brings to my mind a case brought to St. George's Hospital a few months ago, believed to be growth of bone. The poor woman and her friends believed it a growth of bone; and to one who did not understand the characteristics of a case of the kind, it looked uncommonly like bone. It was not so extensive as the specimen sent round. The removal of the tartar with an instrument relieved the patient of the difficulty.

The Chairman then called upon Mr. C. S. Tomes to read his paper.

Studies upon the Attachment of Teeth. By Charles S. Tomes, M.A.

(i.) *Anchylosis.*

The form, the succession, and the development of the teeth have long been made the objects of careful study; but whilst incidental references to the manner in which they are attached to the bones occur frequently, in connection with the other dental characteristics of animals, this subject has not been usually treated comprehensively, nor has it been studied with that same attention which has been given to other sections of Odontology.

In the present paper I shall endeavour, while collecting and comparing some of the various facts which are already known, to at the same time relate a few new facts which have come under my own observation. Whilst engaged upon an investigation of the development of the teeth of Batrachia and Reptiles, the results of which are embodied in two papers lately read before the Royal Society, I became aware that the ordinary descriptions of the attachment represent only imperfectly and inaccurately what really takes place. Moreover, whilst the process of "attachment by anchylosis," as it is to be found described

in text-books, was an uninteresting matter enough, the phenomena which really take place are eminently suggestive, and throw light on that much more complex process, the attachment of teeth by implantation in a socket.

My observations have not as yet been extended over a sufficiently wide area to enable me to give a general account of all the methods of attachment which are to be met with in Vertebrates, for which reason I have preferred to entitle my paper "Studies"; and the limits of time will compel me to confine myself in this present communication (which I hope at a future time to follow up with another) almost entirely to "attachment by anchylosis."

Although no apology is needed for bringing before this Society facts relating to the teeth of any section of the animal kingdom, it may nevertheless not be amiss to point out that, if we wish to read aright the complex phenomena which come before us in the study of human anatomy, we shall do well to commence our inquiries lower down in the scale, where the greater simplicity of the facts with which we have to deal enables us to sift out what is essential from that which is accessory, and thus to go to the root of the matter, without as great a chance of being misled by our inability to estimate properly the relative importance of facts which we observe. Had physiologists neglected to study the brain of that most

instructive animal the common frog, many of the facts concerning the human brain now regarded almost as axioms would have remained unknown; and even the specialist who wishes, so to speak, to get behind the scenes in so limited a matter as the development and structure of the human teeth cannot afford to neglect the evidence ready to his hand in the field of comparative odontology.

Although the occurrence of transitional conditions of implantation renders it impossible to refer every individual case to any one head with absolute exactness, yet, broadly speaking, three methods of attachment occur:—

(i.) Attachment by means of a dense fibrous membrane.

(ii.) Attachment by "anchylosis," or actual fusion of the tooth with the bone.

(iii.) Attachment by implantation in a socket, an organized membrane intervening between the tooth and the socket.

Of the first of these methods I have nothing to say, as I have not as yet examined any specimens in a condition suitable for microscopic study, and, as I have already said, in the present communication I propose to speak chiefly of the second, or attachment by anchylosis; which is the manner of fixation most prevalent in the classes Fish and Reptiles.

In the words of Professor Owen, the teeth of fish "are anchylosed to the jaw by continuous ossification from the base of the dental pulp, the histological transition being more or less gradual from the structure of the tooth to the bone"; whilst elsewhere, speaking of reptiles, we are told that the tooth becomes cemented to the bone by an ossification of the remains of the tooth-capsule. There is, however, no general account of the process of anchylosis, so far as I am aware, which is satisfactory, or indeed really accurate.

If we examine the jaws of an angler (*Lophius piscatorius*) or of a wolf-fish (*Anarrhicas lupus*), which will serve our purpose well as being on a sufficiently large scale to be examined by the naked eye, we see that each tooth is perched upon a short stout pillar of bone, which exactly corresponds in size and outline with the base of the tooth which it carries.

Thus the tooth is not attached to a plane surface of the jawbone, but there is a portion of bone specially developed for its fixation; and this is a fact of no little significance when we come to take a general view of the subject. After an examination of a very large number of anchylosed teeth, I have been unable to find one single instance in which a tooth comes into position, and becomes attached to an even surface of pre-existent bone by means of changes in its own tooth-capsule; and the gist of my present paper is to show that, inasmuch

as in anchylosis attachment takes place by a rapid and special development of *bone* in continuity with that of the jaw, attachment by anchylosis bears a closer relation to attachment by implantation in a socket than has been hitherto supposed.

For the purpose of description I will select the common snake, though many other reptiles would answer the purpose equally well.

Looking at a transversely-divided jaw of a snake, the fusion of the tooth with the bone appears to be very complete, so that the line of union is difficult to discover; and, in point of fact, it is so intimate, that if the tooth be broken away by force, it will oftentimes take with it a portion of bone.

Examined microscopically, the bone in immediate relation with the base of the tooth is found to be of a different and less perfect structure to that constituting the body of the jaw (fig. 2); the lacunæ are large and very irregular in form, and it may very fairly be called a rough and imperfect osseous structure, with which, at its upper parts, dentinal tubes blend. It is this irregular bone which at times breaks away and remains attached to the base of a tooth, and it may be conveniently designated as "bone of attachment" (*b*, in all the figures).

I need hardly remind you that the succession of teeth in snakes is endless, new teeth continuing to be developed at the inner side of the teeth

already in place throughout the lifetime of the animal. Of the time that any one tooth remains in use, it is not possible to form any estimate; but that it is probably short, is indicated by the fact that there are sometimes no less than six teeth present at one time, in different stages of preparation, to replace it.

When a tooth is about to be shed, both it and the bone at its base are attacked by absorption, this taking effect at its inner side before the outer side is at all involved; and in passing I may note that we have in these reptiles a very beautiful and complete illustration of the fact, already well established by other evidence, that absorption, although taking place in front of an advancing tooth, is wholly independent of pressure caused by it. The advancing tooth moves forward, its capsule still embracing it, and the delicate cells of its enamel organ * remain *in situ*, quite undisturbed, even after absorption has been effected to such an extent that the inner side of the old tooth has been cut away, and the successional tooth has passed into the space thus gained. It is obvious, that if the successional tooth had ever come into contact with its predecessor, these cells, at the point of impact, could not have escaped destruc-

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* The thin structureless layer upon the teeth of Ophidia is *enamel*, and not, as is universally assumed, cementum (see Proc. Royal Society, Dec. 1874).

tion. The final shedding of the tooth from which the base has been thus cut away is possibly, in some cases, the result of accidental violence during its use; at all events, among a very large number of sections I have never seen one where the tooth was actually detached from the bone; and was still retained *in situ* by the soft parts.

As soon as the surface of the jaw is vacated by the shed tooth, its successor, still completely enveloped in its tooth-sac, moves up to take its place; in what manner this moving of the tooth and tooth-sac is effected I am unable to see, for no special structure appears to exist for such an end. The tooth, solidly bedded in connective tissue of a loose kind, moves through it under the influence of some unseen agency.*

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* The Batrachia and Reptiles, as I have shown in the paper already referred to (Proc. Royal Society, Dec. 1874), agree with mammals in the general features of the development of their teeth. That is to say, there is never, at any time, such a thing as an open "primitive dental groove"; there are no such things as "free dental papillæ" arising from the bottom of the groove; and consequently the sinking of papillæ into a groove, and their subsequent encapsulation, as described in many places by Professor Owen, are things purely hypothetical, but which, had the views of Goodsir proved wholly accurate, might have naturally been expected to occur. The presence of an enamel organ, whether enamel be developed in such thickness as to deserve the name of a functional coat of enamel or not, is invariable in the classes of Reptiles and Batrachia as also in Mammalia; whether it will prove equally constant in Fish I cannot say, though I should be surprised were it not to do so.

At the time when the tooth-capsule and its contents are moving into position, the tooth having already attained its full length,* the base of the dentine papilla undergoes slight modification, so that the odontoblast layer is no longer confined to the long sides of the cone, but comes to extend across the wide base of the conical pulp (fig. 3, *h*). Thus the tooth is closed by the development of dentine more or less completely across its base, so that the completed tooth is not, as is generally supposed, a cone with its base widely open, but an entire conical shell closed in by dentine, though, of course, less completely than is a tooth with a root. I do not mean to say that the tooth can be isolated in this condition, for the calcification of this basal layer of odontoblasts only takes place simultaneously with the formation of the bone of attachment; the existence of

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* This observation bears upon the problem "in what manner do the human or other mammalian teeth become erupted?" Some authors have inclined to the belief that the eruption of a tooth is due to the elongation of its root; but it has been pointed out that the distance through which the crown moves is much greater than can be accounted for by this cause; moreover, teeth with little or no root can be and often are erupted. In the case of the snake the tooth has attained to its full length, as is indicated by the occurrence of odontoblast cells across the base of the pulp, and even of some calcification at the circumference, before it has reached its place upon the bone. Hence it is capable of movement in two directions, laterally and vertically, at a time when, so far as elongation goes, its growth is complete.

the basal layer of odontoblasts may, however, be readily seen, and the basal layer of dentine easily traced in sections of completed teeth (figs. 2 and 3).

So soon as the tooth with its capsule has reached its future position, a development of new bone takes place beneath it, upon the surface of the jaw, and progresses with very great rapidity, until it reaches the base of the dentine pulp. Here calcification goes on *pari passu* in the base of the dentine pulp, leading to the formation of the irregular basal layer of dentine, and in the tissue outside the tooth-capsule, where rough bone is formed, and thus a complete blending of the two tissues results. The share taken by the tooth-capsule is quite insignificant; it is not, in fact, traceable. Such, in outline (and the limits of my paper forbid my entering into any detail), is the nature of the process by which a tooth becomes "anchylosed," and the greater share of the work is done by tissues external to and independent of the tooth-capsule. The contiguous surface of the bone is first the seat of very active absorption, which has no sooner done its work, than it gives place to equally active ossification, the new bone being apparently beneath the periosteum, and resulting from the calcification of "osteoclasts" (see *c*, in fig. 3).

The portion of cementing bone, for which I have proposed the name of "bone of attachment," appears to be wholly removed with the fall of

each tooth, and renewed with the advent of its successor, so that the surface of the bone, during the absence of a tooth, is covered with the characteristic depressions known as the "Lacunæ of Howship"; these become speedily filled up again by the new bone, though the traces of their presence may be discerned in good sections even after being thus filled up.

Such is a typical example of "attachment by anchylosis" in its most complete form; the union is not, however, always so strong, and in many examples of anchylosis, the tooth, if broken away, separates invariably across the line of junction.

When anchylosed teeth are situated upon what appears at first sight to be a plane surface, one of two conditions will generally be found, on closer examination, to obtain. Sometimes each tooth is implanted in a pit considerably larger than its own base, the interspace being filled up by "bone of attachment"; sometimes each tooth is planted upon an independent process, the interspace between the processes being sometimes filled up by a calcified but structurally imperfect bone, sometimes remaining empty.

The Eel tribe present excellent examples of this manner of attachment (fig. 4). In this figure, which is taken from a section of the jaw of the sharp-nosed eel, each tooth is seen to be attached to the apex of a hollow cylinder of bone, which corresponds pretty closely in diameter to the base

of the tooth.* This "bone of attachment" is of somewhat looser texture than the rest of the jaw, and the direction of its lamination is also different, being vertical instead of horizontal. The contiguous bony processes are sometimes, but not always, united by a clear calcified tissue.

When a tooth gets accidentally broken off, it separates at the line of junction, as the dentinal tubes at its base are arranged without reference to the bone, and without any disturbance in their direction, therein differing from those of the teeth of the Snakes, in which the fusion is more complete. But when a tooth is shed in the natural course, the bony support is invariably rapidly removed by absorption down to the general level of the surface of the jawbone; in which case, as at *g* in the figure, the bared surface of the latter is marked by the lacunæ of Howship.

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* The enamel points upon these teeth recall those of the fossil carboniferous teeth described by Professor Owen as "Ganacrodus," a new genus (Odontol. Transac., vol. v. 1866), of which he says, "I had not before met with any similar structure in the whole range of my odontological researches." The teeth referred to this new genus "Ganacrodus" turn out to belong to Palæoniscus or its allies, of which at least five are known to have teeth thus capped, and had been described years before in as well-known a work as Agassiz's "Poissons Fossiles" (see Month. Review Dent. Surg., Nov. 1874); and the occurrence of these slight enamel tips is by no means so uncommon as Professor Owen supposes. Thus the Newts and the Salamanders possess similar tips, in their case bifurcated

From the teeth of the Eel we may pass to those of the Haddock.

The teeth of the gadoid fishes (Cod tribe) present a remarkable uniformity in their disposition and manner of attachment; the fish from which the figures are taken is the Haddock, it having happened that I have more sections of the teeth of that fish than of any other gadoid, though any other would have answered the purpose equally well. The short supporting cylinder of bone upon which the teeth are planted is hollow, as in the Eel, its central cavity being continuous with the pulp-cavity of the tooth upon it.

The latter is not simply planted upon the flat end of the cylinder, but has, close to its base, a shoulder, which fits upon the top of the hollow cylinder of bone, while the tooth is continued for a short distance further within the central concavity of the bony support (fig. 5).

We have thus, for the first time, something approaching to a socket, and it will be worth while to examine somewhat more closely into the manner of its development, inasmuch as it is in a measure an intermediate stage between anchylosed and socketed implantation.

As in almost all fish, the succession of the

(see Proc. Roy. Soc., Dec. 1874), while in the class of Fish there are many instances of the same thing to be met with. They are easily lost in making sections.

teeth is very rapid, and countless numbers are developed; so that there is no difficulty in finding examples of every stage, even amongst a few sections.

A completed tooth, viewed with the naked eye, appears to rise abruptly from the bone, which presents a level surface; but when it is viewed in section, this appearance is found to be, as already said, deceptive. For that portion which arises directly from the surface of the bone is not tooth, but bone, and was developed by ossification advancing upwards from the jawbone, and not downwards from the tooth. The tooth itself, although abruptly contracted where the shoulder is formed which rests upon the top of the bony column (see fig. 5), nevertheless remains widely open at its base, which does not appear to have any tendency to contract, so as to bear any close resemblance to a root; in fact, it penetrates the interior of the hollow only for a very short distance.

Whether actual anchylosis takes place I am not sure, but the surfaces are very closely adapted to one another.* Thus we have what may be termed a rudimentary socket formed, and the manner of its formation is a matter of no little interest.

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* Nevertheless, a very small amount of violence detaches the teeth, and few remain upon a macerated skull.

When the tooth is shed, the whole tooth-pillar is swept away, so that, if it were possible that the whole series of teeth should happen to be shed at one and the same time, the jawbone would for the time present a perfectly plane surface. In other words, all the bone above the general level of the surface of the jaw is built up specially for and around each tooth; it is "bone of attachment," in the same sense, and just as strictly, as that to which we have applied the term in reptiles.

The development of the basal end of the tooth and of this bone go on *pari passu;* and each individual tooth becomes attached to the bone of the jaw by a new development of bone, specially for itself, by which it comes to have an attachment which is eminently suggestive of a socketed implantation. The new bone arises from the surface of the jawbone, immediately beneath the tooth (see fig. 6); little processes of bone shoot up, coalesce with one another, and form a bony framework around the base of the tooth-pulp at the same time that this is abruptly contracting and forming that portion of dentine which passes within the bone. The structure of the bone is, however, more similar to dentine than that of the Eel; it is, as bone, less perfect, and also, as far as one can judge, more rapidly formed.

The forms of anchylosis which have been briefly reviewed, and which may be taken as fairly re-

presentative of the other modifications, have one striking character in common, to which, if it has been observed at all, attention has not hitherto been called.

To recapitulate, this is, that in every instance, even where it is at first sight inconspicuous, attachment takes place through the medium of new bone, specially developed for that end. In no case whatever, so far as I know, is a tooth attached to the old bone by that simple process of ossification of its capsule or what not, as is described in text-books.

And the interest attaching to this observation is much enhanced when we recall the entire dependence of the sockets upon the teeth in man; a matter which, indicated by John Hunter, was demonstrated to full proof by the laborious investigations of my father * upon the formation of the sockets of the teeth in man. The dictum, insisted upon over and over again by my father, that a tooth coming into place does not come into a socket ready prepared for it, nor use the socket of the tooth displaced, but that bone is moulded around itself when and where it happens to be, receives a new force when we find that so close an analogy exists in the attachment by anchylosis of the teeth of fish and reptiles.

And surely, when we return again to the study

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* "Dental Surgery." By John Tomes, F.R.S. 1859.

of the development of the sockets of mammalian teeth, a matter which is of actual import in influencing our practice, we shall do so with a clearer light to guide us, in that we know, that, in the attachment of a tooth by anchylosis in its simplicity, or by ever so rudimentary a socket, the bone is modelled to the tooth, in full subserviency to the position of that tooth, and that the tooth does not come to take its place upon a spot predetermined for it by any disposition of the bone made prior to its advent.

Fig. 1.

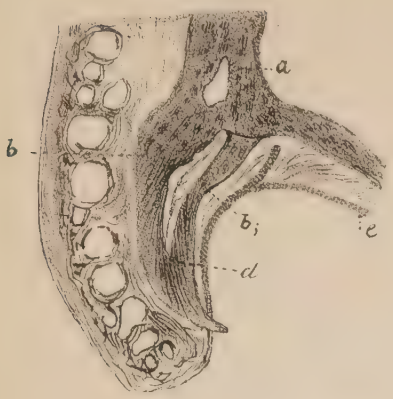


Fig. 2.

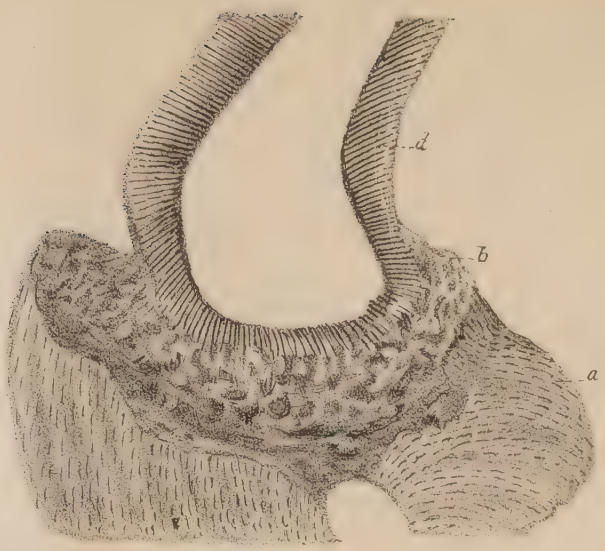


Fig. 3.

Fig. 4.

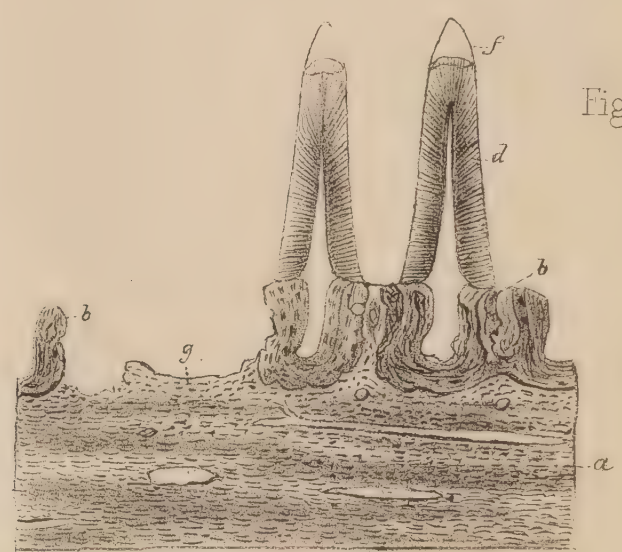


Fig. 5.

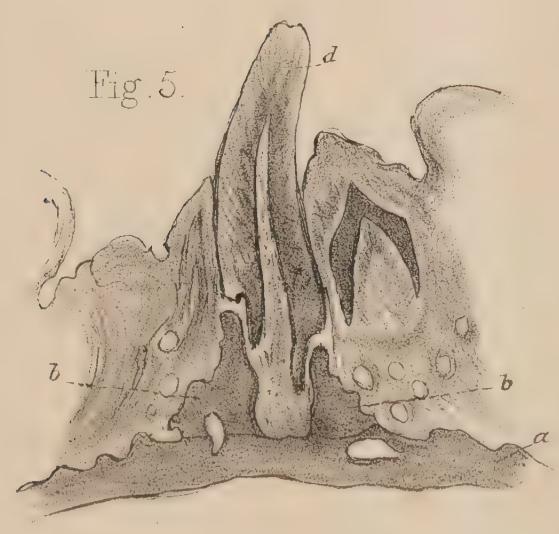
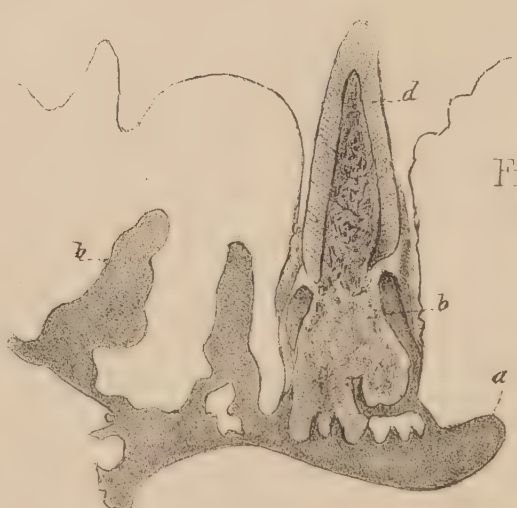


Fig. 6.



Wyman & Sons, Litho. London.

DESCRIPTION OF PLATE.

a.—Bone of the jaw.

b.—Bone of attachment, specially developed for each tooth.

c.—Periosteum of the jaw.

d.—Dentine.

e.—Epithelium of the mouth.

f.—Cap of enamel.

g.—Roughened surface of the jawbone, whence a tooth and its bone of attachment have been removed.

h.—Layer of odontoblast cells, which extend partly across the open base of the tooth as well as up its sides.

FIG. 1.—Transverse section of half the upper jaw of an adult frog.

The tooth in use is attached to the jawbone not merely by being anchylosed to it by its side, but is supported by a special development of bone both at *b* and at b_1, the latter forming a short pillar entirely removed down to the point where a line is drawn across it when the tooth *d* is shed.

FIG. 2.—Transverse section of a tooth and lower jaw of a python. The bone composing the body of the jawbone, marked *a*, contrasts by the fineness and regularity of its lacunæ with the very coarse and irregular structure of the "bone of attachment" marked *b*.

FIG. 3 is a similar section to Fig. 2, but representing a tooth which has just moved into place with its soft parts attached. The coarse bone of attachment which is in course of formation is seen to lie beneath a continuation

of the periosteum of the jawbone ; while the lower border of the tooth-sac is seen to be some little distance above the surface of the jawbone.

FIG. 4.—Longitudinal section of the lower jaw of a sharp-nosed eel.

The teeth, which have short points of enamel, are placed upon the apices of short hollow cylinders of bone, constituting their "bone of attachment." This is of rather coarser texture than the rest of the jaw, and when the teeth are shed it is entirely removed (as at *g* in the section, where the surface of the bone is festooned by Howship's lacunæ).

FIG. 5.—Transverse section (from a jaw hardened in chromic acid) from a haddock.

The tooth is not merely placed upon the apex of a hollow cylinder, but is fitted within it for a short distance. When the tooth is shed, the bony column will be removed down to the level of the black line drawn across its base.

FIG. 6.—A similar section, at an earlier stage of the attachment of the tooth, showing the manner of formation of the bone of attachment. Osseous trabeculæ are seen shooting up from the surface of the jawbone (*a*), which at first coalesce to form a network, which by the advance of ossification becomes converted into a complete bony cylinder. To the left is the hollow cylinder of an older tooth, which has broken off from its summit.

Discussion.

The Chairman.—I have myself been long convinced of the total independence of the temporary teeth from the permanent referred to by Mr. Tomes, and I think we may all observe that, both positively and negatively, in the human teeth. We have absorption of the temporary teeth in cases where they are never succeeded by the permanent, and we have the permanent cut either posterior or anterior to the temporary teeth. I have also observed that absorption of the temporary teeth is arrested when the tooth becomes diseased, pointing at once to its being a vital action in the tooth itself.

Mr. Moon.—It has seemed to me rather, that when a temporary tooth has retained its position, it has generally been when the permanent tooth is not coming; and the very fact that sometimes a permanent tooth comes up before or behind a temporary tooth, would, I think, tend to prove the same thing, —the permanent tooth not coming directly down upon the temporary tooth, the latter is not shed. Not that I mean to say it is the pressure of the permanent tooth that causes the absorption of the temporary one, but I have imagined up to the present time that the coming tooth carried a sort of vascular pad before it, which had something to do with the absorption of the temporary tooth.

The Chairman.—Absorption takes place in the temporary tooth without the permanent appearing, and consequently without any pad whatever.

Mr. Moon.—The only cases that I can call to mind where temporary teeth have remained in the mouth have been where their permanent successors were not erupted, or had been erupted in abnormal positions.

The Chairman.—We have the converse, the temporary tooth becoming absorbed and loosened without its successor being present to take its place.

Dr. Murie.—This paper has given me a great deal of pleasure; and I see before me a series of exceedingly suggestive and interesting facts. Of course, that which strikes most of you is one which I believe is ordinarily taught in your schools; namely, that in the succession of the teeth you have a certain amount of pressure exercised. Mr. Tomes, as far as I understand him, seems to say that there is no amount of pressure used; that the one tooth is carried off and the other gets into the place, without any influence the one on the other. Of course, that is rather heterodox; but for myself I should be inclined to agree with him, judging from processes of ordinary reasoning as to other tissues, apart from the observations which he has made. In the whole range of physiology there is no more extraordinary thing than the growing of incoming teeth; and the point brought before you to-night is one which shows that you have something far more definite to deal with than merely dead matter. To Hunter's mind it was indeed an extraordinary process. Here, without any special given cause or symptoms, as far as appearances go, you have a tooth or teeth losing their vitality. They have not grown old, so to speak, and are still fit for a great deal of hard work, but other teeth come up and press them out. If such is the case, you see at once a physiological process taking place; that is to say, not only have you absorption, but you have an excretion of a certain portion of the body that has served its purpose, has lived to adult age, and then simply dropped off its mortal coil, its place being taken by a younger tooth. In the body we know there is such a thing as the constant carrying away of scales, as every gentleman knows when he brushes his hair. That is said to be owing to pressure from underneath; but I think, without the fact of the skin rising either into bumps or any other way, you have a simple explanation of the same thing that you have here; that is to say, you have a succession of growths, and when the tooth gets beyond a certain sphere it loses that which would enable it to retain its position, and, having served its purpose, goes its way. In the case of bone, you know very well you have two processes going on very often in necrosis; that is to say, you have an old bone being thrown

off within the very precincts of a continuation of new bone being formed; and certainly the case of the formation of new bone is due to a living action, and its influence is not merely that of mechanical pressure. For reasons like these I am quite willing to believe that Mr. Tomes is so far right. Of course I am not in a position to bring forward facts for this reasoning. I believe at one time I had made up my mind very much to the same process of reasoning as he has proved by facts, and, if I mistake not, I have had conversations with our Chairman [Mr. Vasey] both on that subject and on the development of teeth, both of us agreeing that the explanation of the development of the teeth was not quite satisfactory. If that is the case, it proves also very clearly that the teeth belong to the dermal tissues. Then, with regard to the anchylosis of teeth. There, again, I am afraid I shall have to yield and say, if these diagrams are truthful to nature, and I have no doubt that they are, from Mr. Tomes's accuracy in other respects, then this would seem to be the natural process. But to my mind it calls up certain other facts, namely, as to the relation of dentine to bone. I am not prepared to say that that which Mr. Tomes is inclined to think is bone is in a manner true bone, or a modification between bone and dentine. It to my mind is more like osteo-dentine than true bone. Then you say that is true bone. So it is. You are aware in the growth of bone in certain tissues, in diseases where you have a certain amount of the bone formed, you find there is no such thing as true lacunæ or true canaliculæ in the same form as in bone, but you have a modified form of this bone. With regard to the teeth of the Eel, it is very interesting to find a fact which goes broadly in the way of a generalization of a zoological character, for it shows that in whatever aspect you study the teeth they present points of interest. In the case of the Haddock, presuming this diagram to the right shows the early development of that to the left, you have an addition to the ordinary condition of things,—you have a portion of bone as it were inserted into the other, apart from true bone. Is that development periosteal, and not from the dental sac?—because, if we had it quite apart from the bone, it seems to

me that that is not periosteum, and therefore what we ordinarily regard as true bone, but that intermediate stage. I assure you that I have had great pleasure in listening to this paper, and I am pleased to find Mr. Tomes has made so many original investigations. I would urge all young men present to work for themselves, and to see for themselves whether those who have gone before them are really right after all.

Mr. Sewill.—I should like to ask Mr. Tomes whether he looks upon the teeth as dermal appendages, that is to say, whether they are part of the skin-development, and whether comparative anatomy actually proves that fact. With regard to the absorption of the temporary teeth in the human subject, I do not think that that can be in any way due to the pressure received from the permanent teeth, for the reason that the permanent teeth are contained in bony crypts, which separate them from the temporary teeth. I think Mr. Tomes has shown that the absorption of temporary teeth is in no way due to pressure. It is exceedingly satisfactory to hear Mr. Tomes corroborate his father's teaching with regard to the development of jaws being associated entirely with the second teeth, and not with the first, because the converse of that is actually taught extensively. In America they constantly dwell upon the fact that the extraction of a temporary tooth causes the jaw to contract. Mr. Tomes's investigations have conclusively shown that the growth of the jaw, as regards the permaneut teeth, is in no way influenced by the temporary teeth.

Dr. Murie.—I do not think that shedding of the teeth is entirely, in all cases, due simply to this physiological process, but that process has an influence. We know very well that teeth are formed in ovarian cysts, and I think it would be an important thing to investigate clearly the relation of teeth to the cyst, in relation to these ovarian cysts,—that is, whether we have truly the enamel organ and the other characteristics which we are told exist.

Mr. Turner.—I would ask Mr. Tomes, if he has made

observations as to the lining membrane of the inverted columns in the Haddock, and if the tooth-pulp is continued down into the concavity represented on his diagram?

Mr. Charters White.—I should like to inquire what becomes of the tooth-pulp in the Snake if the odontoblasts are continued all round the surface of the pulp and underneath as well, and dentinal tubes are forming towards the centre: there must be a time when that process leaves off, and then, what is found remaining in the centre of that formation?

Mr. Hutchinson.—I should like to ask Mr. Tomes one or two questions as to the bony part underneath the tooth structure,—what the original tissue is, whether the bone is periosteal or cartilaginous in its origin or whether it is formed in a similar way to true cementum? Because, looking at the diagrams as they appear before one, especially the one marked "Python," Mr. Tomes said the structure of the bone underneath the tooth was so very different as to its canaliculæ and lacunæ from the rest of the bone, that it would almost suggest the idea of cementum. I should like to know whether, in his examinations, it coincided more with this structure or that of true bone? Because an interesting idea suggested itself to my mind—it might be a development either of cementum or of something taking its place, which would act as cementum does in the human teeth as a means of communication between the dentine and true bone. That is the more borne out by the diagram marked "Haddock," where we see the dentine as it were going into this structure, which one might call cementum, in a similar way that dentine is continuous with the cementum in ordinary human teeth. Another curious thing is the absorption of temporary teeth. Our President said that this process did not go on so well when the tooth was diseased. One has often noticed that the teeth that give one most trouble by their persistence are those that are necrosed; and that these are the cases where there is the least absorption. On the other hand, it has come to my observation that permanent teeth are very seldom absorbed, unless they are dead. One finds a necrosed

tooth almost absorbed away, and I have seen a second molar entirely dead, its roots absorbed, with the wisdom tooth underneath it. It is a curious thing in the case of temporary teeth, that absorption should be less active in dead teeth, whilst in the case of permanent teeth, it should be more active. I do not know whether other observations have borne out the same fact, but I have noticed it frequently.

Mr. F. Henry.—If, as Mr. Tomes says, absorption of the temporary teeth is not due to contact or pressure, can it be questioned that the point of absorption is always that of contact with the permanent teeth? I have no doubt that there is a vital action going on, but I imagine some part of the process is due to pressure also. We see absorption as a result of pressure upon the permanent teeth;—absorption of the alveolus, which is a similar process.

Mr. Charles Tomes.—In replying, I will confine myself to a very few words.

First, as to the relation of this structure, *i.e.* the bone of attachment, to the teeth, whether it is to be regarded as osteo-dentine or as bone proper, I have only a few words to say; but the thing which settles it more in my own mind than anything else, and which at the same time I will use as my reply to Mr. Hutchinson, is that the limits of the tooth-capsule are perfectly discernible at a period when this bone is beginning to be formed. The tooth, as I mentioned in my paper, goes to its place, capsule and all. At the time that this bone is being formed, the remains of the tooth-capsule hang about the tooth, and cross its bottom distinctly at a distance from the bone. The bone of attachment is formed most distinctly outside the tooth-capsule in the case of the Snake. With regard to answering Mr. Hutchinson broadly what its relations to cementum may be, that I am not prepared to go into, as I do not yet know whether our knowledge of the development of cementum is trustworthy. My opinions on this point are based chiefly on investigations which I shall bring before the Society some day, on the development of the teeth of the Crocodile.

I have been asked where the tooth-pulp ends in the case of the Haddock. The tooth-pulp ends about here (pointing). The tooth-capsule when coming into place is distinctly independent of this bone. It dips down a little way, and not by any means all the way, into the sockets. In the Eel the tooth-capsule descends a little way within the hollow column of bone.

I cannot now enter at greater length into the relations between dentine and bone. Mr. Sewill has asked, what are the relations of the teeth to the skin?—are teeth dermal? The investigations I have lately communicated to the Royal Society will show, as in fact it has been shown before, that the dentinal part of the tooth is distinctly dermal, and the enamel is distinctly epidermic.

Mr. Charters White asked what becomes of the pulp in the case of the Snake. The basal layer of dentine running across the bottom of the tooth in the Python is not so complete as to absolutely shut out vessels from the pulp, but the pulps of these teeth, which have a short duration of usefulness, atrophy very soon, and the odontoblasts also disappear. There is, perhaps, a single loop of vessels in it. It seems to be a connective tissue not very richly nucleated.

As to absorption, I do not quite agree with the remark of the last speaker, that the absorption is always at the point of contact. I have noticed a good many temporary teeth where the main absorption, it is true, was towards the point where the permanent tooth was coming, but where there were also spots of absorption which were quite independent of that; sometimes you will find them even on the opposite side of the root.

The Chairman.—I am sure you will all approve of my tendering the thanks of the Society to those gentlemen who have contributed to the evening's transactions with their casual communications:—Mr. Turner, Mr. Charles Tomes, and Mr. Moon, and also to Mr. Tomes for his very interesting and valuable paper.

It is my duty to nominate two auditors of the accounts for

the General Meeting, and I therefore appoint Mr. C. T. White and Mr. Robert Hepburn.

I have also the pleasure of announcing that I received a letter on Saturday from our esteemed President, Mr. Sercombe, who is so very much better, that we may fairly hope to see him presiding at the next meeting. I am sure this will give you all very great pleasure, as it did me.

The next meeting—the Annual General Meeting—will be held on the second Monday in January.

ANNUAL GENERAL MEETING.

Monday, January 11, 1875.

EDWIN SERCOMBE, Esq., President, in the Chair.

The Minutes of the previous Meeting were read and confirmed.

The President.—Gentlemen: this being the Annual Meeting of the Society, our first duty is to declare the ballot-box open for the election of a President, and the various members and officers of the Council for the coming year. It will be kept open for one hour.

Mr. West.—I am sorry before the ballot-box is opened to have to take exception to the balloting list. I do so very reluctantly, and I trust the gentleman to whose name I have to object will not consider it in any way a personal matter.

The President.—I think you are not in order. Any objection to the balloting list can be stated on the voting-paper. Of course I do not know what you are going to say, but as you are not in order I cannot allow you to proceed.

Mr. West.—If I am not in order I shall resume my seat. It occurs to me that there is an objection to the balloting list as it now stands, and I think one that is calculated to create some degree of ill feeling in the Society.

The PRESIDENT.—You can erase any name or names from your list and substitute others; there is no other course open to you, unless, indeed, you know of anything that would vitiate the election of any gentleman whose name is on the list issued by the Council.

Mr. WEST.—I do not know that it would vitiate the election of any gentleman in any way.

The PRESIDENT.—Then my ruling must be in force.

Mr. WEST.—Except that I would suggest that any one should be allowed to propose other names in lieu of those on the balloting paper.

The PRESIDENT.—That is open to you to do,—not publicly, but by writing, on the voting-paper which has been sent to you by the Secretaries.

Mr. WEST.—Of course merely to do it by writing, unless there is preconcerted action, would be quite useless.

The PRESIDENT.—Still, that is the only way open to you.

The following gentlemen were then elected members of the Society :—

EDWARD P. PARKINSON, Esq., 41, Cambridge Street, Edgeware Road, resident.

JOHN WELLS, Esq., Ravensdowne House, Berwick-on-Tweed, non-resident.

WILLIAM MERSON, Esq., Delphi House, Bournemouth, non-resident.

THOMAS COOKE PARSONS, Esq., Atherstone House, 21, White Ladies' Road, Clifton, Bristol, non-resident.

ANDREW WILSON, Esq., 21, Young Street, Edinburgh, non-resident.

WILLIAM BUCKNELL, Esq., 3, New Street, Salisbury, non-resident.

George Rhind Bull, Esq., Eastgate House, Stafford, non-resident.

Henry J. Hooper, Esq., Clifton Villas, Eltham Road, Lee, Kent, resident.

The following gentlemen were nominated for membership of the Society.

Ashley Gibbings, Esq., M.R.C.S., L.D.S., 119, Warwick Street, Eccleston Square, resident.

Ed. Moore, Esq., Croydon, non-resident member.

The President then said Mr. Edwin Saunders has presented to the Museum of our Society a number of old instruments exhibited in the name of the Odontological Society at the recent International Exhibition, where surgical instruments formed a part. They are valuable, both from their antiquity and from their curiosity. They were the private collection of Mr. Saunders, and he has very generously given them to the Society. Mr. Fox presents, on the part of Mr. Blandy, of Nottingham, the model of an upper male jaw, showing the presence of three supernumerary wisdom-teeth. Also an abnormally-shaped upper central incisor similar to the one figured at p. 26 of the Transactions for November, 1874, from J. Maurice, Esq., of Welshpool. Mr. Warwick Heal presents a specimen of a dilacerated tooth.

Six gentlemen, Messrs. Forsyth, Bennett, Rymer, Hutchinson, West, and Lyons, having been then nominated by the members as Scrutators, Messrs. Hutchinson and Lyons were chosen by the President, by ballot, to fill that office in accordance with the Bye-laws.

The President then called upon Mr. Charles James Fox for his communication upon the new rubber-valve for suction cases.

Mr. Fox said:—Mr. President and Gentlemen, I have been somewhat formally announced as intending to introduce to your notice the new rubber-valve for retaining artificial

palates in their place. The truth is, I proposed to bring it forward at the last meeting, and I then had a special motive in so doing which I have not to-day, inasmuch as Mr. Hall, the original inventor, from America, and Mr. Rutterford, who first introduced it into this country, were then present at my request and prepared to reply to any questions put to them. Owing to want of time, however, I was requested to reserve my communication to this evening; and now I fear it will prove of little novelty to you, as you have all, no doubt, either seen Mr. Rutterford's valves, or received the sample that was sent out by the Dental Manufacturing Company of their own make. I was indebted to Mr. Rutterford, in the first instance, for all the information I obtained for the last meeting, and for the loan of a piece which had been worn with the new valve with great comfort, and is still worn by the patient with the same comfort to the present day. The Dental Company have since also supplied me with models, &c., to illustrate what they have introduced in addition to the valve, viz., their platina bar and cup, which appear to produce a more perfect suction cavity. As you have all doubtless seen these, I will merely hand them to our President, and not detain you much further than to say that my only object in introducing the subject to-night was to elicit from other gentlemen some account of their experience with these various contrivances, and an expression of opinion as to their value. My experience of this contrivance is confined to three cases that I have seen, and which have been reported upon most favourably by the patients. One case was that of a nurse at the Great Northern Hospital, for whom I put in a plate as an experiment; she has at my request attended here to-night, so that you will be able to see it in the mouth. One remark has been made by some with whom I have conversed upon the point; viz., that they make such good plaster impressions, that they have no need of such extraneous help. I must admit the perfection of their models, but I must confess also that I have found occasionally patients whom I can only term "wooden-mouthed," who do not seem to have any life or spirit in their mouths, or any ability to acquire the habit of suction, and I think in a case like that, this little instrument

would prove useful. There is also another case in which it would be useful, namely, where a patient resolutely refuses to have the roots of teeth extracted, and still wishes to have a suction plate on a very flat palate: there I think this valve might be of use. I will not detain you further, as I am really anxious that the matter should be ventilated, and that we should hear whether in the experience of gentlemen present there is any of that drawing of the mouth that I have heard of, and of which I have in these three cases seen no example.

Mr. Oakley Coles.—I have tried this appliance in five cases, and in three of them it was perfectly satisfactory. The cases in which it was successful were those in which there was a well-defined alveolar arch, not very deep, whilst the palate was exceedingly flat. There the whole of the suction valve could be brought into tolerably accurate apposition with the surface of the palate, and a good fixture was obtained. In two other cases I tried it where the sides of the palate were at an angle to each other; that is to say, they did not present a flat surface in the median line: there the valve utterly failed, and it is in those cases, I believe, we shall find this contrivance is not available. The elasticity of the rubber is sufficient to counteract the suction you would get from the palate itself; otherwise I have found it most serviceable, and if it be nicely adjusted, so that the piece does not drop and hang suspended, as it may do, you get a very good result. I feel, as a member of the profession, I should like to protest somewhat against the Dental Manufacturing Company bringing out these contrivances almost immediately the American inventors introduce them into this country. We ought to have some consideration for those people who invent things, and take the trouble to bring them out for the benefit of the profession. We should give them some support and some preference over a Company that just takes the idea and reproduces it without any respect to the real moral right which the inventor has in the matter.

The President.—I am sorry to say I am obliged to take exception to your last remark, because it is directly in oppo-

sition to the spirit of our Society, which objects to all patents or any private right in any patent. It is enough to dismember a member of the Society, taking a patent, or having an interest in a patent, according to the Bye-laws of the Society.

Mr. Oakley Coles.—I am not speaking in reference to members of the Society at all. I simply refer to two people who bring out an invention that is certainly valuable in a number of cases. Directly it is introduced into this country it is imitated and brought out by somebody else. I say, if we are to stimulate original inventions we ought to support those people who bring them out in the first instance.

Mr. Mummery.—I should like to ask Mr. Coles if he has met with a very highly congested condition of the mucous membrane opposite to the disc?

Mr. Oakley Coles.—I have not found that condition, because I have always first advised patients to use a preparation of chlorate of potash with rectified spirits of wine, glycerine, and water.

Mr. Mummery.—I have occasionally adopted a plan invented several years since by Mr. George Ash, of Great Marlborough-street. The floor of the chamber, next the tongue, was formed of a disc of elastic rubber, the air being expelled by gentle pressure. In adopting that method, I sometimes encounter the difficulty to which I have just now referred, that the vessels of the mucous membrane become so highly congested that the elastic chamber cannot be worn. It answers well as a temporary means of accustoming the patient to the plate in such cases, if altered as soon as the plate obtains stability I regard this new method of securing a vacuum as very good, and convenient in adaptation, and only wish to guard against its injudicious use in certain cases.

Mr. Harding.—I have used four plates made with india-rubber discs, and the best evidence to me of their success is the fact that my patients have gone away, and I have not seen them again. I am quite certain if they had not done pretty

well, I should have been considerably troubled. I can only give one hint that may be useful, and that is, that the chamber for the india-rubber disc should be made considerably larger than we are generally advised to make them. India-rubber is apt to swell, and it overlaps the edge of the chamber and produces a little discomfort to the mucous membrane, but if the chamber is made a good deal larger than the disc, it will act very much better.

Mr. MUMMERY.—I took especial care on that point, having extended the chamber beyond the margin of the disc very considerably; but I was obliged eventually to remove the disc in one case. In two other cases, the disc has succeeded very well.

Mr. C. J. FOX.—I agree to a certain extent with Mr. Coles in his remarks about inventors. At the same time, as I am rather implicated by having mentioned the imitation of an invention before the Society in this way, you must permit me again to draw attention to the fact that on the last occasion my chief object was to introduce to the notice of the Society the inventor himself, Mr. Hall, and that was how I first came to bring the matter before the meeting. The question occurred to me, as well as to others, as to how far the Company alluded to was justified in taking it up, but on inquiry I was informed that there was no patent in England; what they claim as their own special introduction is the little platina chamber, which may or may not be of value. I should be very sorry to detract in any way from the introduction by Mr. Rutterford of this invention to this country, for we are all very much indebted to him not only for this, but for his general zeal and promptitude in introducing American contrivances to our notice.

Mr. WEST.—Has Mr. Coles tried these discs in lower cases? For my own part, I find very little difficulty in retaining upper suction pieces *in situ*, but have had considerable trouble with edentulous lowers.

Mr. C. J. Fox.—I ought to mention that it has been used in lowers. This was especially mentioned to me; there is a small oblong chamber made for the purpose by the Company.

Mr. Coles.—I should not think of trying it for a lower case. If the lower case was apt to move about, I should adopt a plan suggested to me by Mr. Turner, to load it thoroughly with lead or some heavy material. With regard to the upper cases, where the sides of the palate form almost an obtuse or sometimes an acute triangle, I intend to try a suction chamber on each side, so as to get the valve in contact with a flat surface instead of with a curved surface. I think that experiment may be worth trying. I shall certainly attempt it, and if I succeed I shall be very happy to report the result to the Society.

The members, on the invitation of the President, then proceeded to examine the patient brought by Mr. Fox. After which, Mr. Mummery being called upon by the President, read the following communication, which had been forwarded to him by Mr. Warwick Hele, of Carlisle.

A Case of Dilaceration *of an* Upper Permanent Incisor, *due to improper Lancing.*

Youth, aged eleven years.

Tooth removed: Upper left permanent incisor, on November 14th, 1874.

Previous History.

As an infant there was a tendency to cerebral disturbance shown, on the presentation of the upper left temporary incisor. A surgeon who was called in lanced the gum deeply *over* the presenting tooth—not *at* or *towards* its incisive edge. The tooth at once irrupted through the incision. At four years and a half the tooth shed, and was immediately succeeded by the tooth now removed. Its incisive edge was without enamel and quickly succumbed to the attacks of soft caries. As the other

incisors irrupted (all being well formed and in place) it became gradually displaced and everted mesially. At this time, two years since, its appearance suggested the probability of its being a supernumerary tooth, especially as such have been known in the family history.

In accordance with sound practice, had the diagnosis (of its being a supernumerary tooth) been correct, it should have been then removed; a second professional opinion was desired, and Mr. Mummery, who examined the case, advised the retention of the tooth until the canines presented themselves as irrupting. Last Spring, those teeth being well forward in their growth, he decided that the time for removal had come; but, until lately, the patient had not been in a fit state of health to sustain the operation.

Since last seen, over the tooth, at about three-eighths of an inch from the highest remaining portion of the crown, there showed through the gum a nodule of some size. Bearing in mind the possibility of a true incisor appearing in front of what might be a supernumerary tooth, when the patient was sufficiently anæsthetised, an incision was made across the nodule, and from its middle down to the front of the portion of tooth visible. Examination showed it to be the bulbous portion of the fang nearly protruded through the socket.

The tooth was then removed. It proved to be the permanent central left incisor dilacerated. The dental capsule was probably divided at the time of the lancing, and dilaceration of the cap of developed dentine and enamel from the pulp was due to the outward and forward growth of the temporary incisor, it having occupied a plane parallel with the floor of the mouth.

A popular prejudice here prevails, that if an infant's gum be lanced too early a cicatrix is formed, which makes the after irruption more difficult; hence, lancing is mostly performed *over* a tooth, not at the position of irruption.

There are on the tooth two ink lines. The broader is drawn where the gum rested, the higher where the enamel finishes. The spot of ink is on the point of the bulb down to which the incision for examination was made.

The PRESIDENT. — I understand that Dr. Leslie, from America, is anxious to exhibit a specimen of a new form of crystalline gold to the Society to-night: we shall be happy to hear him.

Dr. LESLIE.—It gives me a great deal of pleasure to have had the honour of an introduction to this Society. At home I have read occasionally the proceedings of this Society as they have been detailed in our American journals, and I have always read them with a great deal of pleasure. The preparation of gold for filling teeth has been a special subject of study with me for many years. I had the pleasure of introducing cohesive gold foil to the dentists of the United States in 1839, and for many years since then I have continued my experiments, being very desirous to produce an article of greater utility than foil. I think I have succeeded in producing a form of crystalline gold which has decided advantages. I do not say that it will take the place of foil entirely; but I feel confident that it is a most excellent article. I do not come before you with any recommendations from the other side of the water, but I come before you with this my invention; and nothing gives me greater pleasure than to stand by the side of a dentist, and for him to fill a tooth under my instructions how to use the gold, because then he can realise its advantages for himself. I may say I have had a good deal of difficulty in getting this specimen produced, the sun being so much obscured by the London fogs. It has been prepared to be presented to Professor Tyndall as a specimen of the crystallization of gold, which is entirely new as a product of investigation; but, as I was informed to-day that there was to be a meeting of this Society this evening, it occurred to me that gentlemen present would like to see it; for, altogether independently of its uses as an article for filling teeth, I think it will be recognised as a very beautiful specimen of this form of gold. I may add that this gold lies at the bottom of the dentine beautifully; there is no trouble in starting a filling, and on that ground alone I think it is invaluable to the profession. It works very kindly with foil if they are worked alternately. I think, on the

whole, it is a very valuable addition to the forms of gold now in use, being at once soft and cohesive.

The PRESIDENT then called upon

Mr. HUTCHINSON, who said I have two short communications to lay before the Society. The first is the case of an elderly lady who came complaining of considerable pain between the lateral and central incisor teeth. This is a situation in which one very seldom finds pain, and therefore it was somewhat remarkable. The teeth were perfectly sound without a trace of decay. The sensation she described was that of a grinding, pressing pain. I tried to put a piece of the thinnest note-paper between the lateral and central, but they would not even allow of that. She described the pain as if the central were pushing the lateral out, and I found there was a considerable space, perhaps wide enough to allow the insertion of a shilling, between the two central teeth. I decided on passing a very thin separating file between the two teeth. I succeeded in doing that, and while I was watching it with a magnifying glass the space closed up again. This was decidedly puzzling, and seemed to be as if the two centrals were actually separating from one another, as if there was some active agent at work to make one tooth separate from the other. She expressed herself somewhat relieved as soon as the file had been passed through, and then I put a piece of thin rubber between the teeth which seemed to act as a sort of buffer. She immediately said that gave her comfort, and the pain was cured. It might be a good deal of imagination, but she was so old and sensible a person, that I do not think it was entirely. The reason I bring it before the Society is to ask any one of more experience than myself to explain the separation of the central incisor teeth, and their elongation, in elderly women especially. This is noticed by M. Taine, in his letters from England,—the elongation and separation of the central incisor teeth. I am not able myself to account for it, but there is no doubt the separation of these teeth, and their pressure against the laterals, was the cause of discomfort in this case. The next case was one in which the gums receded from the lower molar tooth of a gentleman,

over eighty years of age. He had pain in his tooth, and suffered considerably. The only way in which he got at all relieved was by having a collar of india-rubber tubing cut to fit the tooth. Mr. Sercombe made a piece of india-rubber tubing, with a bit of gold wire attached to prevent the tube slipping down the gum and separating it still further. This acted as a non-conductor of heat and cold, and afforded very great comfort.

Mr. Oakley Coles.—Allow me to call the attention of the Society to a Gas Reflector that has been brought before the profession lately, for use in these dark days. It has been introduced to the profession by Mr. Stewart, F.R.C.S., a gentleman practising as a dentist. It is a large reflector with a corrugated surface, having a small fish-tail burner in front of it without glass, and it gives certainly, with a very small expenditure of gas and but little heat, an excellent light. I understand from Mr. Hepburn that one has been fitted up in the room upstairs, so that members may have an opportunity of seeing it after the meeting. Certainly, as a ready and simple means of illuminating the mouth on dark days and at night, it answers exceedingly well.

The time having now arrived for closing the ballot-box, the Scrutators, Messrs. Hutchinson and Lyons, with the Secretary, retired to examine the votes, and at the same time all visitors were requested to withdraw during the discussion upon the alteration of the Bye-laws.

The President.—We now have to bring under your notice a suggested alteration in the Bye-laws. The Bye-laws of our Society were drawn with great care originally, and the proof that they were wisely drawn, I think, is to be found in the fact that we have very seldom had either to alter or to add to them. Circumstances, however, are likely to occur from time to time to make some alteration desirable. Parliament has recently passed an Act, naming certain days in the year as holidays, and we all know how thoroughly they are accepted by the people. It is thought desirable, therefore, that to Bye-

law 70, which says:—"The ordinary meetings of the Society shall be held on the first Monday in each month from November to June, both inclusive, at 8 p.m. precisely, except in the month of January," shall be added the words, "or when an Act of Parliament holiday occurs on that day, then the meeting will be held on the Monday next ensuing." We have acted upon this plan during the past year and the year before last, but it involved a special order from the Council and a special communication to the Society. By adding this clause to Bye-law 70, it will not be necessary to send out a special notice to that effect on every occasion of an Act of Parliament holiday falling on the first Monday of the month.

No objection being made, the alteration was put from the Chair and carried unanimously.

The PRESIDENT.—The second alteration is to Bye-law 21, which runs as follows:—"The President and two senior Vice-Presidents, one resident and one non-resident, shall go out of office annually, and shall not be eligible for re-election to the same office for the ensuing year. The other officers shall also go out of office annually, but may be re-elected." It is proposed to strike out the two words "President and," so that the bye-law will read, "the two senior Vice-Presidents," &c. This subject has been considered by the Council on more than one occasion, and at last it is felt desirable to submit to the Society the advisability of altering the rule in the way I have just read.

Mr. UNDERWOOD.—I should like to make one or two remarks upon the proposed alteration of this law, which the gentlemen whose names were down as Vice-Presidents in the last year's list have themselves been most forward in altering, reintroducing an element into the presidential body which I cannot help thinking will carry with it the feelings of the whole of the Society. But it appears to me that while those gentlemen who, from their position in the profession are fully and justly entitled to look forward to holding the presidential office, have been content to withdraw their claims, it is desirable to consider whether some arrangement might not be made by which they should be in a position to be placed in the

chair, so that, supposing they gave way to one of the older members of the Society, they should have the chance, at any rate, of occupying it in the ensuing year. My attention has been particularly drawn to this by the fact that our friend, Mr. Vasey, should have been content to allow his name to pass away from the list of Vice-Presidents. I am not wishing at all to interfere with the wisdom of the Council; but as a member of this Society, I should very much regret that Mr. Vasey's chance of being a President of this Society, to which I am perfectly certain he will do great honour, should be utterly withdrawn from him, and to suggest whether the Council may not find some way out of this difficulty; whether they may not, for instance, in the case of Mr. Vasey, put his name down as one of the Vice-Presidents, so that his chance of election would come on in the ensuing year, we having for the time being the advantages of the services of our old friend, Mr. Tomes, for the present year. I put it forward simply as an act of justice to those gentlemen who are by their position in the profession fully entitled to hold this important office. I speak with some degree of feeling in this matter, inasmuch as you did me the honour to make me one of your Presidents; and I do not wish to see men who are quite as much entitled to occupy that position lose their chance of so doing.

The PRESIDENT.—I am sure you will all appreciate the kind feeling which has actuated Mr. Underwood in his remarks, though, indeed, they are based upon a misapprehension. It is supposed that because the President has always been elected from the list of Vice-Presidents, that he always must be. The Bye-laws are not to this effect; the President may be elected from the body of the Society, without having been on the Council at all. I have no doubt the wish expressed by Mr. Underwood will be acted upon at a future period. I am not at liberty to say more. The step we have taken has been entirely at Mr. Vasey's request.

Mr. VASEY.—Gentlemen, I have taken great interest in this proposition for some years. There need be no misap-

prehension at all: we have from the very foundation of the Society annually elected every officer, and the important office of President we are allowed to select and fill from the resident members. We are unlimited, except with regard to one, and the striking out of those two words will give us the power of electing any one of the resident members as President. But still it would be an annual election, and the spirit and principle of the Bye-laws of the Society will in no way be altered or changed. The only result is, that in the event of our at any time desiring to re-elect the President, which we have been hitherto prevented from doing, we may do so. It is an extension of the franchise to the members. Occasionally when we get into a difficulty we find ourselves distressed at not being able to meet the difficulty on account of the law. We cannot alter the law at any moment, and it is an invidious thing to alter a law to meet a special case. If this bye-law is altered the working of the Society will go on just as hitherto, the President and other officers will be elected annually just as hitherto; but, should the time come when we desire to re-elect the President, we shall have the power to do it.

Mr. West.—I feel that I ought to give some explanation of my rising at the commencement of the meeting to take exception to the balloting list. The exception I was about to take was to that of President, because I felt that Mr. Tomes, although a most worthy man, had already passed the chair, and that by electing him for the forthcoming year, we were losing sight of such other worthy men as Mr. Vasey and Mr. Coleman; and there was a fear in my mind that, as many members have before expressed it, there was a cliqueism in the Society (No, no). I do not say there is myself, but still it has been mentioned, and I should be sorry if any remark I may make should give rise to the slightest ill-feeling; it is quite contrary to my wishes that such should be the case, but still such a remark has been made in my presence. In fact, I met a gentleman belonging to the old College of Dentists a morning or two ago, and asked him if he was coming to this meeting. He shook his head ominously and said, "I belonged to the old College of Dentists

and I do not like the present arrangement." I do not know what his grievance is; but still there is an unsatisfactory feeling existing amongst some of the members of the old College of Dentists, I fancy the Odontological Society must be in some respects to blame for it, and I thought the election of Mr. Tomes as President would have the effect of increasing that feeling amongst these gentlemen. There was another idea that crossed my mind, that it would go abroad that the Odontological Society after a successful career of eighteen years had at length exhausted all their talent, and were compelled to resort to old Presidents in order to fill the vacuum. But Mr. Vasey has put me right on that subject, and, as he tells me it is his express wish that he should stand by, of course the Society is bound to abide by it.

Mr. Rymer.—With regard to the observation made by Mr. West as to there being an impression of cliqueism existing in the Odontological Society, I think there are extremely few of the members of the old College of Dentists who entertain such an absurd notion (Hear, hear). I do not myself know one; and with regard to the proposed alteration, I think it shows at any rate that there is no idea of cliqueism in the Council, for it is a most liberal proposal. No member of this Society would be more pleased to see our excellent friend Mr. Vasey in the high position of President than myself; but under the circumstances I think that he has acted wisely, and shown characteristic self-denial in supporting, or I suppose suggesting to the Council, this proposed change. I still hope that we may see, and that before very long, our friend Mr. Vasey occupying the high position which you, Sir, now do with so much dignity.

Mr. Vasey.—Allow me one word, to put Mr. Rymer right with respect to the proposition. I believe it was Mr. Coleman who proposed it first. We have thought that we allowed our best men to pass away too readily from us, and the idea has been alternately to have one of our old Presidents, to keep them among us and retain their interest in the Society, and in the alternate

year a new one, so as to keep the old and new blood as it were together. I think it will work well for the Society if we carry it out, but it still remains to you at every annual meeting to elect whom you like.

Mr. C. WEST.—I was a member of the Odontological Society before the amalgamation, and therefore did not speak personally of the old College of Dentists, as I had no grievance myself.

The resolution was then put from the Chair and agreed to.

The Scrutators having now returned and reported the result of the ballot to the President, he announced that the following officers and council were unanimously elected as nominated :—

President.—John Tomes, Esq., F.R.S.

Vice-Presidents.—Resident : Alfred Coleman, Esq. ; Samuel Cartwright, Esq. ; John W. Elliott, Esq. Non-resident : S. Clifford Gibbons, Esq. (Brighton) ; T. R. M. English, Esq. (Birmingham) ; G. W. Buchanan, Esq. (Glasgow).

Treasurer.—James Parkinson, Esq.

Librarian.—Thomas A. Rogers, Esq.

Curator.—C. S. Tomes, Esq.

Honorary Secretaries.—Henry C. Sewill, Esq. (Council) ; J. Smith Turner, Esq. (Society) ; J. Oakley Coles, Esq. (for Foreign Correspondence).

Councillors.—Resident : Aaron G. Medwin, Esq. ; T. C. White, Esq. ; Charles James Fox, Esq. ; Edwin Saunders, Esq. ; Charles Vasey, Esq. ; G. A. Ibbetson, Esq. ; Henry Moon, Esq. ; W. G. Ranger, Esq. ; Thomas Edgelow, Esq. Non-resident : F. J. Clouston Scott, Esq. (Swansea) ; George Henry, Esq.

(Hastings); G. W. Smith, Esq. (Manchester); E. P. Bromley, Esq. (Southampton); Frank Petty, Esq. (Reading); J. E. Rose, Esq. (Liverpool).

Mr. PARKINSON then read the Treasurer's Report, which will be found at p. 99.

The PRESIDENT.—It now remains for me to make a few remarks and bring this meeting to a close. He then read the following Address.

PRESIDENT'S ADDRESS.

Gentlemen, — To-day our Society completes another year of its existence, and its closing hour will not be inappropriately spent if it is devoted to an examination of its work during that period. You will all remember with what hope it opened; we were on the eve of migrating with the Dental Hospital, from the house which had been our home for many years, to these more extensive premises. Opinions varied as to the advisability of the move—and whenever was any important step taken in which more than one individual had a voice that there was not difference of opinion? So far, however, from such differences being undesirable, I regard them as signs of a healthy vitality: nothing is so much to be dreaded as a dead uniformity of opinion. "Ubique solitudinem faciunt et pacem appellant" was not a peace we desired; a free and unrestricted expression of opinion was given on both sides; but there was no partisanship, and the minority yielded most loyally to the clearly-expressed opinion of the majority.

> "Then none was for a party,
> Then all were for the State."

I think, on the whole, the Society might be said to have been advantaged by the move; we have a more commodious meeting-room, although we

must all admit it lacks the elegance of the late one. Our Museum accommodation is so infinitely superior, that I think the balance will be freely accorded in favour of our present quarters; but I will not give further expression to my individual opinion on this point, as my object is only to advert to the loyal support both the Hospital and this Society have received during the year, even from those who were opposed to the change, and that, as a consequence, the Society is to-night in a prosperous and healthy condition. It is my happiness, in retiring from this Chair, to know that the Society is both financially and numerically in a better position than it has ever been before. It has been my great misfortune to be prevented by indisposition for a period of two months from taking any active part in the work of the Society; but I have had the great satisfaction of knowing that the interests of the Society have been so ably and diligently sustained by my friend Mr. Vasey, to whom I desire thus publicly to offer my warmest thanks, that it has suffered no loss by my absence. And, Gentlemen, whilst his name is before us, I must be allowed to allude to his disinterested conduct in retiring into the body of the Council, in order that the Society may have the enormous advantage of being presided over by Mr. Tomes during the coming year. Mr. Vasey's natural modesty of character has induced him to take a step which his fitness to

preside over this Society, as shown during the two months he has so kindly discharged my duties, rendered altogether unnecessary; but I trust he will be willing at a future day to occupy a post he is so well fitted to fill with credit to himself and advantage to the Society.

The staff of Officers with whom it has been my happiness to be associated during my year of office has been so unexceptionally good, that but little credit is due to me for the success of the year. All the vital parts of the Society are sound; the treasury, upon which all depends, was never in a healthier condition. Our Treasurer has sketched his report in rather neutral tints, but I think I can trace that to his disappointment at not adding to our funded property this year; but the bare fact that he has entertained the hope of being able to do so, is in itself a proof of its flourishing condition. Our move to these premises has necessarily cost a considerable sum of money; expensive fittings have been placed in the Museum: all these have been paid for without incurring debt, or encroaching upon the small sum we had funded. In addition to these extraordinary expenses, a considerable increase to our publication expenses has been caused by the issue of a monthly sheet of lithographs, with description of pathological specimens of interest found in our Museum. The value of the sheets to all, but especially to those of our members who are

unable from distance to consult the Museum itself, is immense; and your Council thought they could not use a portion of the income of the Society to greater advantage. I think you will agree with me that if our Treasurer can report himself out of debt after meeting these heavy calls, he might have very fairly drawn his report in rather warmer colours. We have had the good fortune to have a succession of able financiers as Treasurers; but no one of these gentlemen has been more entitled to your thanks and entire confidence than Mr. James Parkinson, who now holds that important office, and who I hope will be long spared to do so.

Scarcely second in importance for the welfare of the Society to the Treasurer stand the Secretaries. The work of these gentlemen is continuous; on their tact depends much of the efficiency of the Council, and the harmony of the Society. I have found Messrs. Harding and Sewill earnest and intelligent, and, as a consequence, we have had an abundant supply of intellectual pabulum at all our meetings, and the affairs of the Society generally have gone as smoothly as a wedding-bell.

It is enough for me to say that Mr. Thomas A. Rogers has been the Librarian, to satisfy you that the duties of that office have been discharged with singular conscientiousness and thorough efficiency; for are not these the characteristics of

that gentleman in everything which concerns the profession he has done so much to raise in usefulness and public estimation?

An integral part of the scheme of this Society was the formation of a Museum. Members of the Society have, from its earliest days, contributed liberally from their private collections for this purpose; many rare, some unique preparations have been thus accumulated; but without methodical arrangement such preparations were of little avail. The Society has been singularly fortunate in having secured the services of a gentleman eminently fitted by energy of character and technical knowledge for the important office of Curator. By Mr. Charles Tomes's exertions the Museum has been arranged in its new quarters in the manner most suitable for educational purposes. We believe it is without a rival in the world. The lithographic sheets published monthly with the "Transactions" were suggested by Mr. Tomes as a means of making the contents of the Museum more generally known and more available to the profession generally. The entire work of taking these sheets through the press is undertaken by him; and I am sure you will agree with me in saying that they reflect credit on him and the Society. Few know how much time this gentleman devotes in the discharge of these duties.

During the past year the "Transactions" have been under the editorship of Mr. Alfred Coleman.

We must all agree, I think, in saying that the editorial work has been well done; the parts perhaps have not always appeared with that punctuality we might have desired, but I have no doubt this has been due to that state of health which at last compelled Mr. Coleman to seek a more genial climate for a period. No member of the Society could be more missed from among us than Mr. Coleman: his regular attendance at our meetings, the earnest and intelligent part he so constantly took in our discussions, his gentle and considerate bearing to all at all times, have together made him one of the most popular and useful members of our Society. His absence, which I trust is only temporary, is deplored by us all. I hope this expression of our deep interest in his welfare and our desire to have him with us again will cheer him while away. During his absence his editorial duties have been most efficiently discharged by Mr. Fox. I am glad to be able to say that I received a letter from Mrs. Coleman a few days since, conveying the gratifying intelligence that Mr. Coleman is expected home in about three weeks, very much improved in health.

While on the subject of the "Transactions," I would suggest that, as a means of lessening the expense of production, the discussions might be condensed and published in the third person, without in any way diminishing their value.

I feel bound to say that I have received the most cordial and hearty support from the Council generally, to all of whom, together with the various Officers, I beg leave to offer my warmest thanks.

Without attempting to analyze the various papers which have been read during the year, I may say they have for the most part taken a wider range than hitherto; and as the education of dentists is becoming broader, we must look for this change in the character of our papers. The two first read this year were on important points connected with mechanical dentistry; the next was a short but valuable communication from Professor Rolleston, "On an Ancient British Skull," which he was kind enough to present to our Museum; the next was "On Epithelioma of the Tongue." The importance of the dentist being a man acquainted with other diseases than those immediately connected with the teeth was pointed out by surgeons who took part in the discussion on this paper. Early treatment of this disease is of vital importance, and long before its presence would be suspected by the unfortunate victim, it might be discovered by the dentist, who could advise aid to be sought while it would be of any avail. "Transplantation of Teeth"; an able paper "On Dentigerous Cysts," by Mr. Thomas Bryant, of Guy's Hospital; "On the Condition of the Mouth and Teeth during Pregnancy"; and "Studies on the Attachment of the Teeth," have

successively engaged our attention; and without in any sense being chargeable with using a stereotyped expression, I may say they have each reflected credit on the writers and have been a valuable addition to our literature.

But I think the chief feature of the year has been the prominence which has been given to casual communications: one evening was entirely and very profitably devoted to them. In this informal manner we get a vast amount of practical information.

To the writers of the various papers, as well as to those who have furnished the casual communications and taken part in our discussions, our best thanks are due.

At the beginning of these remarks I said that the Society was numerically as well as financially prosperous. Twenty-five new members have been elected during the year, the largest number, I believe, for many years; our losses, however, have been large: nine have resigned from various causes, three of this number having retired from practice, and thus no longer eligible to be members of the Society; in addition to these five have been removed from us by death,—Dr. Hitchcock, of Boston, U.S.; Messrs. Little, of Bristol; Parsons, of Bristol; Perkins, of London; and Yeo, of Malta; and since I have entered this room, I have learnt that I must add yet one more to this sad list, viz. Dr. E. Parmly, of New York.

Dr. Hitchcock had only recently been elected a member of our Society, but he had been long and favourably known in this country as a highly accomplished and cultured gentleman: his early death has inflicted a heavy loss on the profession. A recent visit to England gave many of us the pleasure of Dr. Hitchcock's personal acquaintance.

Dr. Parmly, though not having added to our store of dental literature as his distinguished fellow-countryman, Dr. Hitchcock, had done, was, nevertheless, well known by many of us as an elegant and successful operator.

The highly complimentary notices which appeared in the Malta papers concerning our late *confrère*, Mr. Yeo, show how distinguished a position he held among his fellow-countrymen in that island. He was well known, too, and much esteemed by many members of this Society as a highly creditable practitioner of our art. With the other members of our Society whose deaths we deplore I was personally unacquainted. I trust it will be long before we have again to place so many *immortelles*.

In conclusion, permit me to glance for one moment beyond the limits of our Society to the profession, which this Society has done so much to elevate. Foremost among the events of the past year must be placed the removal of the

Dental Hospital and School to the house in which we are now assembled: the results of this change are already beginning to be felt. Hitherto our work had been done in so unobtrusive a manner that the general public were under the impression that dental surgery was not taught systematically in this country; it was desirable, therefore, in justice to ourselves, that our light should no longer be kept under a bushel, but set on a hill. The public are taking a deep interest in our work, and a very general feeling of satisfaction exists that students can acquire in this country a thorough knowledge of the art they are to practise.

In connection with this subject I may notice that the first dental scholarships founded in this, or, I believe, in any other country, have been founded this year, one by that gentleman to whom we already owe so much, Mr. Edwin Saunders, and another by Messrs. Fletcher and Agnew, of Warrington.

Beyond our own "Transactions" I know of only one work of importance published this year; viz., that by Mr. James Salter. Very important discussions have been carried on in the various journals on the all-important subject of materials for stopping teeth and the best modes of manipulating them.

Although no great revolution either in theory

or practice can be recorded, the year may nevertheless be regarded as one of steady and satisfactory progress.

And now, Gentlemen, it only remains for me to restore to your hands the important office you did me the high honour to entrust to my care last year. I have striven to do my duty; but no one can feel as deeply as I do myself how imperfectly it has been accomplished; for, although I have much cause for congratulation, as I have endeavoured in these few remarks to show, I am painfully sensible that I might have accomplished much more than I have done.

Let my last word be one of hope that the coming year may be characterized by even greater prosperity to the Society than the past, and of congratulation that it is to be presided over by one who has done already so much to ennoble the profession we all love so well.

Discussion.

Mr. Mummery.—Gentlemen, a most pleasant duty devolves upon me, and I am sure you will most heartily coincide with me in the very few remarks I shall make. I think our Society has been singularly favoured by having at its head during the past year a gentleman of such well-known, indomitable energy as our late President. It is rarely that such energy is combined with so much urbanity; they often are qualities that run sadly counter to each other, but when they unite in the same person they become invaluable. I think it is most fortunate that during his reign we should have effected this happy transplantation from our old quarters to this place. I know that to his indomitable determination to carry out that plan if it could be done, we are very largely indebted for the great success which has attended the original proposal. There is another point which I think I ought not to pass over. Our late President has always shown himself anxious to set up a high standard of practice, to adopt what has been discovered in other countries, to try how far these methods have been worthy of our adoption, and if they have been he has carried them out,—if they have not, he has rejected them. I should suppose there is no one among us who has made more experiments upon new processes, whether in surgery or mechanics, than Mr. Sercombe, and to him on that ground the profession, I think, is largely indebted. And I am sure the cordiality with which he is always willing to meet every brother in the profession must be gratifying to every one who has come in contact with him. It would be out of place for me to extend these remarks; I can only say we have felt deeply grieved that there should have been any interruption to his health during his year of office, and that we all heartily rejoice that he is able on this occasion to occupy so effectively the presidential chair.

I am sure you will join by acclamation in a vote of thanks to Mr. Sercombe (applause).

The PRESIDENT.—I can only thank you, gentlemen, from my heart for the kind expression of approval to Mr. Mummery's remarks you have given utterance to now. Happily, no matter calculated to cause strife or ill blood has cropped up during the year, and the cordial way in which you have sustained me has made it a very easy task to pass through the year without anything but harmony and goodwill.

Mr. UNDERWOOD.—I have great pleasure in proposing a vote of thanks to our most excellent Treasurer for his services during past and former years, though, as you say, his Report to-night was drawn somewhat in neutral tints. Those neutral tints were perfectly explained by yourself, and I think there can be but one feeling in the Society,—that our most earnest and hearty thanks are due to Mr. Parkinson for the excellent manner in which he has discharged the duties of Treasurer, and for the great amount of labour he has taken (applause).

Mr. JAMES PARKINSON.—Mr. President and gentlemen: Without detaining you, I beg to return my thanks for your kindness to me, and if I have served you efficiently I am amply rewarded by your acknowledgment. At our next annual meeting, I shall hope to be able to produce a balance-sheet with a surplus.

Mr. TOMES.—I have great pleasure in proposing a cordial vote of thanks to the Secretaries, who, as the Chairman has stated, and as we all know, have discharged the heavy duties of the Society during the last twelve months with singular success, not only with regard to the Meetings of our members, but also in catering very efficiently in the way of Papers. The account you have given of the proceedings of the past session cannot but be received with great feelings of pleasure by all who are interested in the welfare of the Society. I beg, therefore, to propose a vote of thanks to the Secretaries, and I cannot leave

out of that a vote of thanks to the Curator, though he be my son (applause).

Mr. HARDING.—I beg to thank you for the kind manner in which you have proposed this vote of thanks, and to assure you that it has been a pleasure to do the duty which it has fallen to our lot to perform.

The Society then adjourned.

At the next meeting a paper on Dentifrices, by Dr. J. B. Rottenstein, of Paris, will be read.

The Treasurer in Account with The Odontological Society of Great Britain.

Financial Statement, 1873–1874.

Dr.	£.	s.	d.
To Balance at Bank, October 31, 1873	166	11	4
In Treasurer's hands ditto	33	0	4
Deposit Note	200	0	0
Interest on Stock	23	0	3
Interest on Deposit Note, 31st December	3	12	5
Annual Subscriptions	348	12	0
Entrance Fees	33	12	0
Arrears	6	6	0
Sale of "Transactions" (Garner)	17	3	0
Ditto (Wymans)	7	16	0
Sale of Surplus Books	2	10	0
Petty Cash, Cheque of 3rd December, 1873	20	0	0
	£862	3	4

Cr.	£.	s.	d.
By Rent (one year)	50	0	0
Wymans (Printing and Publishing)	204	16	6
Deposit Note	200	0	0
Dividends invested	23	0	8
Cash ditto	0	14	3
Garner (Refreshments)	15	18	6
Reporting	25	4	0
Stationery	1	8	0
Postage and Receipt Stamps	9	8	4
Library	34	7	6
Museum	89	0	0
Society	33	15	11
In Treasurer's hands	0	0	0
Balance, at Bank	171	12	2
Petty Cash	2	17	6
	£862	3	4

Total Receipts for the year 1873–74	£442	11	8
Total Disbursements ditto	466	15	7
Expenditure over Receipts	£24	3	11

TOTAL ASSETS OF THE SOCIETY, OCTOBER 31st, 1874.

Stock in the New 3 per Cents	£800	3	10
Deposit Note	200	0	0
Cash at Bankers	171	12	2
In Treasurer's hands	0	0	0
	£1,171	16	0

January 7th, 1875.

Examined, and found correct, { THOMAS C. WHITE. ROBERT HEPBURN.

Statement of Deaths and Resignations of Members, and New Members elected during the Year 1873–74.

	Resident.	Non-Resident.	Honorary.	Corresponding.	Total.
Deaths	1	5			6
Resignations	8	1			9
Members Elected.....	6	7	1		14
,, Re-elected..					
,, Lapsed.....	1	2			3

Number of Subscribing Members (Resident)	87
,, ,, ,, ,, (Non-resident).....	158
,, Honorary ,, ...	25
,, Corresponding ,, ...	21
Total.....	291

Rowlandson. 1787.

TRANSPLANTATION.

The caricature which forms the accompanying illustration was presented to the Society some years ago by Mr. Statham, and is of such interest as a record of a long-abandoned operation, that no explanation of its appearance in the pages of the "Transactions" is needed.

It was executed in 1787 by Rowlandson, a very famous caricaturist, who died early in the present century, and has been reproduced with great fidelity by Messrs. Wyman, a matter of some little difficulty, for the accuracy of the outlines has been secured by the aid of photolithography, a process which alone would have given a paltry unsatisfactory picture, owing to the colouring and to the staining of the paper by age.

The picture tells its own tale, and records many of the features of the operation as it was then performed.

In order that no time may be lost in the transference of the tooth, the lady of fashion sits side by side with the ragged boy from whom the "scion tooth" is being extracted. On the right a second operator is in the act of adjusting the transplanted tooth in the mouth of another lady; while behind them an old man admires in a looking-glass his mouth, in which the operation has apparently been completed.

Going out of the door are two ragged young persons, one of whom is contemplating the coin lying in the palm of her hand, which she has received in compensation for the loss of her tooth.

On the door is inscribed, "Most money for Living Teeth," and on the wall hangs a framed document, on which we read,—

"Baron von Hoh——,
Dentist to her Imperial Mightiness,
The Empress of Rusia (*sic*)."

The operation of direct transplantation of teeth, a freshly-extracted "scion" tooth being inserted with the least possible delay in the socket from which an unsightly tooth had just been removed, is described by John Hunter with some little detail, and in terms which would lead one to suppose that it was something of a novelty in his time.* The fact that it should have been made the subject of a caricature by Rowlandson, and the gist of some passages in the pages of Hunter and other writers, seem to indicate its having been practised with considerable frequency; so that it had become well known to the public, and was not a mere curious experiment, performed by a few practitioners only.

Nevertheless, although it seems to have come

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* Hunter was born in 1718, and died in 1783.

rapidly into favour, its popularity was very short-lived, for, in 1810, we find a writer speaking of it as quite abandoned.

The manner in which the operation was performed we may gather from Hunter's work,* of which contemporary writers made very free use, as is indicated by internal evidence in their own books:—

"A fresh tooth, when transplanted from one socket to another, becomes, to all appearance, a part of that body to which it is now attached, as much as it was of the one from which it was taken; while a tooth which has been extracted for some time, so as to lose the whole of its life, will never become firm or fixed; the sockets will also in this case acquire the disposition to fill up, which they do not in the case of the insertion of a fresh tooth.

"The scion tooth, or that which is to be transplanted, should be a full-grown young tooth; young, because the principle of life and union is much stronger in such than in old ones. It will be scarcely necessary to observe that the new teeth should be perfectly sound, and taken from a mouth which has the appearance of that of a person sound and healthy; not that I believe it possible to transplant an infection of any kind from the circulating juices, although we know

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* "The Natural History of the Human Teeth." By John Hunter.

from experience that it may be done by a matter secreted from them."

While insisting on the necessity of the tooth fitting accurately, or rather being a little smaller, he adds :—

"The best remedy is to have several people ready, whose teeth are in all appearance fit; for if the first will not answer, the second may. I am persuaded this operation has often failed from a tooth being forced in too tight.

"It will be hardly necessary to mention, that the sooner a scion tooth is put into its place the better, as delay will perpetually lessen the power upon which the union of the two parts depends."

The following extracts from contemporary writers will serve to indicate the opinions held of the operation at the date of the publication of the caricature :—

"Thus much being premised on the patient's State : If the Dentist makes a proper choice of the Tooth to be transplanted, and takes it from a young healthy * Person, and conducts himself through the Operation with Judgment and Dexterity, the Patient may expect Success, equal to his most sanguine Wishes." †

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* "The Subject from whom Teeth are taken for this Purpose cannot be too strictly and closely examined, as Experience warrants the Assertion, that the Venereal Virus may be communicated by this Means."

† "A practical Essay on the Human Teeth, to which is sub-

"A dead Tooth, when properly prepared, has been found to fasten as firmly, and endure in some Instances, for near as long a Time, as a Tooth taken immediately from a living subject."

Elsewhere the writer gives his charges thus:*—

Transplanting a living Tooth	£5	5
Ditto a dead Tooth	2	2

Berdmore speaks of the operation in less favourable terms, as exemplified by the accompanying extract:—

"The few instances in which they succeed surely are not sufficient to counterbalance the hazard; and were these people properly versed in the dentist's art, they would certainly prefer the healing of the socket, and the use of a well-constructed artificial Tooth, or a human Tooth with the root filed off, and formed to fit the void place exactly; For this will occasion none of the evils that attend the former practice, which is not only

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joined an Appendix, exhibiting the Author's Charges for the several Operations he performs. By Paul Eurialius Jullion. 1781."

* As a standard by which to estimate the relative expense of the operations, the following extract from his charges may be added:—

Filling with Lead	£0	5	0
Ditto with Gold	0	7	6
A complete Set of *Human* Teeth with Gold Springs	73	10	0
Pivoting a Tooth	2	2	0

precarious, ineffectual, and dangerous in general, but also immoderately expensive; for it is not to be supposed that any young person will sell a handsome sound tooth, to be torn out of his head, without being extremely well paid for his loss and pain.

"In many instances, where this transplanting of Teeth has been thought to have succeeded well, I am of opinion that a new crown has been grafted to the old root, or the extracted Tooth has been replaced; and the patient has been made to believe that a new Tooth, extracted from another person for the purpose, is placed and made to adhere in this manner." *

Even in 1783 the operation seems to have been upon the wane, and Wooffendale † mentions the frequent occurrence of gum-boils, and other objections to it:—

"The transplanting of teeth is a desirable operation, when it succeeds; but it may not be improper to observe, that its success in a great measure depends upon chance;" adding, "There is an operation I have frequently performed with success, though not always. It is, when a tooth gives

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* "A Treatise on the Disorders and Deformities of the Teeth and Gums. The whole illustrated by Cases and Experiments. By Thomas Berdmore, of the Surgeons' Company, and Surgeon-Dentist to his Majesty. 1768."

† "Practical Observations on the Human Teeth. By B. Wooffendale. 1783."

pain, and the nerve cannot readily be destroyed, to take the tooth out, stop the hollow with gold, and replace it." "Having this operation performed carefully, the tooth so replaced will often answer as well through life as if it had never been diseased."

In 1810, it is said,* "It was once a very popular practice to substitute a complete tooth in the place required." "When it succeeded, the transplanted tooth in general remained only a few years; from such circumstances it gradually sunk into disuse, and is now, we hope, consigned to its merited oblivion."

Although it is exceedingly unlikely that the operation of Transplantation will be again in any form revived, there is something to be learnt from the fact that teeth so treated did in many instances become secured in their new sockets.

Thus in the operation of immediate torsion, regarded by many practitioners as so hazardous that they never resort to it, a far less degree of injury is inflicted upon the socket than by an extraction with the old rude instruments; even supposing the worst to happen, and the nerves and vessels at the apical foramen to be torn or obliterated, the tooth has a vastly better chance of reunion

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* "A Popular Essay on the Structure, Formation, and Management of the Teeth. By John Fuller, Surgeon-Dentist. 1810."

than a transplanted tooth could under the most favourable circumstances possess.

In Hunter's famous experiment, vascular communication was re-established with the tooth-pulp, in a tooth which had been transplanted into the comb of a cock.

The ordinary cause of failure in transplantation appears to have been alveolar abscess. But it is noteworthy that Hunter, although speaking of transplanted teeth as being occasionally ejected by the entire absorption of their root,* and as being liable to decay, makes no mention of their liability to blackening or discoloration; so far as it goes, this omission points to vascular communication with the pulp having been sometimes re-established, so that the pulp did not perish.

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* In the Museum of the Odontological Society there are two specimens of replanted teeth which have thus lost the greater part of the fang. The one was a stump carrying a pivot tooth, removed on account of prolonged and incurable periosteal inflammation, and replaced rather as an experiment (it was retained some time, but never became very firm); the other, a wisdom tooth, extracted for the purpose of filling, filled, and replaced by a practitioner who claimed to be the originator of Replantation. The absorption of the fangs necessitated its removal some six months later.

GENERAL MONTHLY MEETING.

Monday, February 1, 1875.

J. TOMES, Esq., F.R.S., President, in the Chair.

The Minutes of the last Meeting were read and confirmed.

The President then delivered the following Address :—

Gentlemen,—I give you my sincere thanks for your kind and cordial reception on this the second occasion of my accepting at the hands of the Society the distinguished office of President. The desire to secure the esteem and respect of our fellow-men, and especially of those engaged in like pursuits to ourselves, who, of all others, are best qualified to form a just estimate of our worth, is an object of justifiable ambition; and the warmth of your welcome leaves me reason to think that I have not wholly failed in gaining the good opinion of my professional brethren, and in rendering some service to my profession.

In seeking a President from amongst those who have already passed the chair, and who were active agents in the formation of the Society, you have shown an interest in the past, in the early days of the Society, and a desire, perhaps, that a trace of the same energy and wisdom which laid the foundations, and carried on their way our prosperous Society, School, and Hospital, should be reproduced. If such be the case, I may thank you; but I cannot congratulate you upon the selection of an agent; and my doubts increase whenever I think of the cost at which the choice has been made. Mr. Vasey and Mr. Coleman, your Vice-Presidents, for what they thought to be the good of the Society, urged upon me the acceptance of an office which they would have in succession filled, and filled, as I believe, far better than myself. They have, with that generosity and self-sacrifice, their capability of which we had had already quite sufficient proof (and we needed no further proof), postponed, perhaps abandoned —for the future is not ours—the highest and most distinguished position which we, in our collective capacity, can bestow upon an individual member of our brotherhood; and the fact that they have insisted on giving place to another is in itself a sufficient proof that they are singularly well fitted for the office of President, and, in my opinion, should, in the interests of the Society, have taken it. However, you and they have

willed it otherwise, and I will do my best to discharge the duties of the office which I have, not without misgivings, on personal as well as on general grounds, accepted. But if I am unable to attend all the meetings, I must ask for your indulgence, and beg that you will regard my absence as a forced and not a willing absence.

You have taken me from amongst the past presidents, and you may reasonably expect me on this occasion to recur to the deeds of the past. But it is not desirable that I should do so otherwise than very briefly, for our history is in good hands, and we may ere long expect to see a careful statement of all the historical facts that are worth preservation. For sufficiently obvious reasons I shall avoid the use of the names of living men, with two or three exceptions, and those will be the names of friends who are not practitioners in our branch of surgery, but who have, nevertheless, laid us under considerable obligations.

To begin, then, the first attempt at a combination of dental practitioners with which I am acquainted took place in 1843. Minutes of the proceedings of the several meetings are preserved in the handwriting of one whose loss we have all deplored, and whose place in the minds of many of us remains, and must ever remain, a void—Arnold Rogers, our third president. There arose amongst those who met together a difference of

opinion as to practitioners who were members of the College of Surgeons acting with those who were not; and although addresses were sent to Sir James Graham, who was then in office, and to the President of the College of Surgeons, by those who held the more liberal views of association, amidst this difference of opinion the attempt at professional organization altogether failed, and but for the preservation of the minutes, very little would now be known of what really took place. Although present at the meetings myself, and engaged in drawing up one of the memorials, my memory served me but poorly till refreshed by the minutes taken by my old and well-esteemed friend, and but lately placed in my hands.

A cause abandoned as hopeless is soon altogether forgotten, or at best becomes latent, and is capable of again coming into active operation only under a combination of circumstances different to those in the presence of which it fell into discredit.

In 1855, when many of those who were engaged in the earlier movement had passed away, and time had blunted the recollection of much that happened in the minds of those who survived, such a combination of circumstances presented itself. A very influential member of the medical profession and of the Council of the College of Surgeons, after a careful and prolonged consideration of the subject, undertook, upon pro-

fessional and public grounds, to advocate the formation of, I may now say, the Dental department of the College of Surgeons, and he did so with a full knowledge of the difficulty of the task, and that a considerable time must elapse before it could be brought to a successful conclusion. It was thought desirable that the movement should be commenced by the presentation of a suggestive memorial, signed by a few of the more eminent dental practitioners. A memorial of this character, known afterwards as "The Memorial," was presented by Mr. Arnott, and the attention of the College was engaged by the earnestness and strength of the arguments which he adduced in its favour. A committee, consisting of Mr. Green, Mr. Lawrence, and Mr. Arnott, was appointed to consider the prayer of the memorial.

The legal adviser of the College was consulted as to its powers in respect to organizing a dental department, and he gave it as his opinion that power must first be obtained from the Crown in a charter somewhat similar to the midwifery charter. This was the first of the many difficulties we had to overcome. Up to this time no meeting of dental practitioners had been held, the signatures to the memorial to the College having been gained by personal solicitation. The ball had been set rolling by a moderate force, and in a direction in which it was believed possible to make it roll onwards, if the strength of numbers could now be

obtained to assist in pressing it towards the desired goal. With this in view, the memorialists, from time to time in varying strength, met and proceeded to form a Society, the Council of which undertook not only the duties of conducting a learned society, but also in some sort those that pertain to a representative body, for the purpose of advocating systematic dental education as a branch of surgery in connection with the College of Surgeons. It takes but a few minutes to tell of the accomplished fact; but many meetings of few and many members, held at our own houses, and often extended into the small hours, were required before the organization of the Society was completed. Many of us were unaccustomed to combined action; indeed, the Dentist, from a professional point of view, was then, in numerous instances, a solitary being, having scarcely a professional acquaintance. But he was not therefore destitute of fixed opinions upon professional subjects. And it needed the exercise of self-sacrifice in abandoning long-cherished notions, and of toleration in accepting views not our own, before we got into working order. There are those present this evening who will remember how frequently they were interrupted in their daily professional work by the demands of the new Society, or by the importunities of its more zealous supporters. The results show that the various steps taken, directly and indirectly, in the forma-

tion of the Society were calculated to command success. But there were many practitioners who from the first quite disapproved of our proceedings, and with true English vigour set about the establishment of a rival scheme,—the College of Dentists, a body designedly independent of all other medical institutions. This was for a while worked with great energy, struggling towards the same educational ends as ourselves, but by different ways. Finding, however, after a time, that the weight of opinion lay on our side, and recognizing the fact that the two schemes could not prosper, the members of the College of Dentists joined the Odontological Society, and generously and heartily adopting our views, and throwing all the weight of their influence towards the fulfilment of our cause, were henceforward in no way distinguishable from the original members of this Society. I shall not stand alone in the opinion that the union thus happily brought about was a subject of very sincere pleasure to all who were actively striving to benefit the Dental profession. But I am losing the order in which the several leading events in our history occurred.

Before the union of the two parties, the Bill which brought into existence the Medical Council passed the Legislature. The College of Surgeons, struggling hard with the other medical corporations, and with medical reformers, to preserve what it believed to be its rights, did not venture

to insert a dental clause in the Bill then before Parliament, but made it known to us that the College was quite willing one should be introduced. After several troublesome misadventures, a clause was introduced empowering the College to obtain from the Crown the Dental Charter now in operation, by Mr. Alexander Beresford Hope. I am glad of the opportunity of making this statement, for there are few of the younger members of the profession who are aware how much they are indebted to that distinguished statesman for the great educational advantages they now enjoy. Our School, Hospital, Museum, and Library, taken as a whole, has not an equal in Europe, and even in America it is not surpassed, perhaps, collectively, not equalled; and, but for the dental clause in the Medical Bill of 1857, it might not, probably would not, in its present relations at all events, have come into existence.

The power to obtain a charter being granted, all difficulty seemed at an end; the way seemed quite clear. But it was not so; for on the College making application to the Crown, the subject was referred by the Government authorities to the Medical Council. That body, without the power, or perhaps the will, to negative the charter, insisted upon the introduction of a clause denying our right to register under the Medical Acts. We insisted upon the justice of a registration of those who had passed a recognized examination as

licentiates in dental surgery, separated from, and in no way interfering with, the registration of the medical practitioner. But we failed to convince the Medical Council, and the charter was wisely accepted by the College of Surgeons, giving us nine-tenths of what we required, and leaving the right to registration to be gained on some future opportunity. Had we gained more, perhaps our real gain would have been less, for the need of further exertion has been, and still continues to be, a bond of union, and a preventive against the apathy which often succeeds energy after a great purpose has been gained.

To guard against such a contingency a committee was appointed, and still exists, whose duty consists in watching any Acts of the Legislature likely to affect the dental surgeon for ill or good, and endowed with the power to act, in case action should seem desirable; and such action has been taken more than once when pending Bills offered a chance of registration.

The College of Surgeons, on gaining the charter, took the initiative, and required that we should agree upon a curriculum, and, in conformity with an early promise, establish a school fully organized to give practical effect to the educational scheme, which we had so persistently pressed upon them. With the organization of the Dental Hospital and School, the labour of originating was completed, and it remained only to insure success that the

newly-formed institutions, or, I should prefer to say, the departments of one comprehensive educational institution, itself a department of the great subject of surgery, should be worked with well-directed energy.

I should not be doing my duty to those who are no longer amongst us, did I not tell you that the material steps by which our educational edifice has been constructed were not taken fortuitously, but were the parts of a carefully-considered measure, the outline of which was communicated to the representatives of the College of Surgeons, before that body moved the first step toward the formation of its Dental department. Mr. Green and Mr. Lawrence, convinced by the able advocacy of Mr. Arnott, became active supporters of the measure. And we may with pride point to the facts that they, alike distinguished for their learning and great eloquence with Mr. Arnott, constituted the surgical section of the first Board of Dental Examiners. It is to the latter friend, however, that our gratitude is especially due, but for whose steady support, often given at times when support seemed almost useless, our cause must have been lost, and our labours, as in the attempt made in 1843, thrown away.

I cannot, in recounting our obligations, omit the name of Mr. Balfour, the late secretary of the College of Surgeons, who, from an advantageous position, lost no opportunity of advocating our cause.

We have been helped, and we have been helpful, and I do not fear to say that the senior members of our body look with excusable pride upon the high position of usefulness and respect to which our Society and School have risen. I cannot separate them. The Society is an adult school, where the members teach each other by recording and discussing the results of research and of practice; while, in the School and Hospital, the student receives his instruction from one or other of our members, and, on attaining a competent knowledge of the subjects taught, becomes, in most instances, himself a member of the Society. The School is the great training-ground from which we select our successors, our assistants, and the members of our Society; and from the Society we select our lecturers and dental surgeons. As I have said before, they are the several departments of an educational body, and I should be grieved to see their relations less intimate,—a feeling, I think, common to those who were personally concerned in their creation.

I have told you of our obligations to our lay friends. I must now remind you of our still deeper obligations to our past Presidents, passed in every sense. They cannot speak for themselves, but I will speak for them, though it be but too feebly.

Mr. Cartwright, our first President, though

much out of active professional life, gave us all the encouragement in his power.

John Parkinson, the second of our Presidents, was always present at our meetings; and that directness of purpose and kindliness of thought, not unknown in other members of his family, were unfailing bonds of union amongst the newly-gathered members of council.

Arnold Rogers, the third to occupy the Presidential chair, gave us all he had,—his mind, his time, his purse,—ever regarding the claims of the Society as prior to those of social or private life. He attended our meetings almost unfailingly long after his declining health shut him out from general society, and in great part from the practice of his profession; when no longer able to leave the house, excepting, perhaps, at rare intervals, he acted as our Treasurer; and none but his most intimate friends knew how frequently he taxed his pocket in the behalf of the Society, or for the purpose of saving its funds.

Mr. Harrison, the fourth on our list of Presidents, was born for public work. He at all times, and under all circumstances, quite naturally gave precedence to public, even when the claims of private duties were to ordinary minds the more pressing. His respect for laws, his love of order, and wonderful memory, extending even to the recollection of minute details, with his ready and complete acceptance of the voice of the majority,

were qualities that fitted him beyond most men for the offices of counsellor and president. All who enjoyed the advantage of acting with and under him will agree with me, that he filled those offices admirably, and that we have never failed to miss his presence at our meetings.

William Minshull Bigg succeeded Mr. Harrison. He was the representative of two generations. Both his father and grandfather, Mr. Minshull, held leading practices in London, and the grandson could tell us more of the past ways of practice than most other men. He was as regular an attendant at our gatherings as feeble health would permit, and ceased only to come amongst us when sickness drove him from all professional occupation.

I cannot claim to have given you a sketch of our professional history, for there are many points I have not even touched upon. It has been at most but a sketch of a sketch, and taken from memory. The work of years cannot be described in a short address; but if I have succeeded in adding to your knowledge of, or interest in, the early doings of our Society, then my end has been gained.

Furthermore, if my presence in this position, and the account I have given of the prolonged labours of many of the senior members of our profession, to place at the disposal of their successors a complete education, should tend to induce our students to avail themselves of these

educational opportunities; and of the valid testimony, the dental diploma gives that they have become accomplished dental surgeons, then great indeed will be my gratification.

The Odontological Society has been, and still is, the representative of the Dental profession; through its influence the scattered units of the profession were brought together and united into a brotherhood; by it the Legislature and College of Surgeons were moved to give us the dental diploma, and the Hospital and School sprung up at its bidding. And, gentlemen, the future of the Dental profession is mainly in its hands,—in your hands. The degree of wisdom and energy, devotion and personal sacrifice with which you conduct the Society,—I mean the Society in the broadest sense,—will determine the degree of usefulness of the Dental Surgeon, and hence his place in public esteem.

The older—perhaps I had better say the oldest—members have done much,—it may be as much as they could or can do,—and they look to you to do more. Rendering still such assistance as they can, they hold you responsible for the future of the Society, and, through it, for the future well-being of the profession. I do not think I have at all over-stated the case.

In conclusion, I must ask you to support your President by individually contributing at our meetings the results of research and of experience

in practice, so that he may be enabled to conclude his year of office with a report as favourable as that we have recently heard from your late able and energetic President, Mr. Sercombe.

Mr. MERSON was admitted a member, and Mr. W. J. WOODMAN, of Canonbury, Islington, was nominated for membership.

The PRESIDENT then called upon Mr. Charles James Fox, who exhibited a lower left wisdom-tooth, which had been extracted by mistake by a dentist and at once replaced eighteen months previously. It had given no trouble till lately, and when the patient consulted him, there was so much peridental inflammation that he removed it. Mr. Fox also showed an upper plate with an india-rubber suction-valve, made on the plan alluded to by Mr. Mummery at the last meeting as having been contrived by Mr. George Ash, who, however, was then obliged to use thin gold instead of the elastic rubber now used. This particular plate was invented by Dr. Leared, in ignorance of any previous similar plan, and he had it executed, though somewhat roughly, by his dentist.

Mr. Fox then handed to the President a tooth filled by Dr. Leslie with his crystalline gold and kept in ink for a week. On the President handing it back, it was sawn in half and sent round for examination.

Dr. LESLIE said his great object had been to produce an article of gold that would go into the tooth easily, and work very kindly, something that would yield to lateral pressure and be more like an amalgam. The crystalline gold that he had exhibited possessed these qualities, being perfectly soft and perfectly cohesive. He had used it for filling teeth upwards of a year ago, and it had worn most satisfactorily. With the

instruments he had here he was not able to reach quite to the bottom of the pulp-cavity of the tooth which Mr. Fox had exhibited, but he was sanguine that from the point where the gold came in contact thoroughly with the dentine there would be no trace of ink.

Since the last meeting he had shown a specimen of his crystalline gold to Professor Tyndall, who had expressed great admiration of it. When he was shown a cavity filled with it, he was interested in seeing the dense form it assumed by the force of pressure.

Mr. C. S. Tomes.—At Mr. Fox's request I have removed the filling from the tooth filled by Dr. Leslie, and although it is not quite water-tight, but has leaked at the two sides, yet I consider it a very good result to have attained. In conjunction with Mr. Ewbank, I have been making a number of experiments, which I hope to lay before the Society at some future time. Our experiments have demonstrated to me that cohesive gold is so difficult a material to make a water-tight filling with, that this of Dr. Leslie's appears to be very good. If you set to work with cohesive gold, you will find that most of your fillings will leak a great deal more than this filling. But there is one point which I should like to mention, and that is, that everything depends upon the ink that you use. If you put them into an ink which consists of solid particles in suspension, that ink will not penetrate fillings which a true solution would. Such an ink as Draper's Dichroic, which is a true solution, is alone suited for the purpose.

The President then called upon Mr. Oakley Coles to read the paper by Dr. Rottenstein, on Dentifrices.

Dentifrices. By Dr. J. B. Rottenstein, Paris.

It will, I presume, be readily admitted that dentistry has, during the past thirty or forty years, experienced many very great and important changes; so great, indeed, that they may be considered to be almost equivalent to a complete revolution in the profession.

It was reserved for the "New World" first to give the signal for progress, and this signal was followed by a prompt response from this side of the Atlantic, particularly from England; and in the struggle which ensued, the dental profession in general has exercised great energy in order to attain the highest point of skill and dexterity, and to endeavour to reach that of perfection.

Until comparatively recently, it was considered as the *ne plus ultra* of professional excellence to fill teeth with gold and other substances, and to replace lost teeth by artificial substitutes.

Some few, however, of the profession opined that the practice of dentistry should not be considered as a mere art, and that mechanical attainments, however great, would not alone suffice to elevate it to a science, and thus place it upon an

equal footing with that of other specialities of medicine.

The profession in England may well be proud of the part it has taken in the accomplishment of its own elevation, when such men as John Tomes and others have, by their writings, so powerfully contributed to the advancement of dental science, and the discussions and publications of the Odontological Society have recorded its signal services. It is before this Society that I now propose to present a few observations upon a subject which, although considered by many as but incidental to the profession, is, nevertheless, of the greatest importance—of more importance, indeed, than has been as yet accorded to this matter.

I refer to dentifrices.

And although we may and do treat successfully the diseases of the teeth which present themselves to us, we must not forget that many of these diseases might have been prevented by judicious hygienic treatment; and if in the healing art the old and oft-repeated adage holds good, that "an ounce of precaution is better than a pound of cure," it can certainly be applied with great force to the teeth, for at the present day it is an admitted fact that cleanliness of the mouth serves to preserve the teeth from decay.

It is also generally recognized that the teeth can only be kept clean by the frequent and regulated use of dentifrices. This may appear as

a broad assertion to some; but if you will accord to me your attention for a few moments, I will endeavour to show the good and evil that may result from their use or their abuse.

It may be truly said that the dental art commenced with the composition of dentifrices and remedies for the cure of the toothache.

Beauty of the teeth has been from time immemorial considered as one of the greatest ornaments, especially of woman; and Solomon, in his "Song of Songs," extols the beauty of the teeth of the Queen of Sheba.

The superiority of the Greeks in all that pertains to taste and art admitted, is it at all to be wondered at that their earliest writer on medicine,—I mention only Hippocrates,—gave attention, though moderately, it must be confessed, to the subject? Hippocrates recommends, as a tooth-powder, animal carbon, and for a mouth-wash senna, anis, semen, and gum myrrh. (De Morb. Mulieb., lib. ii. S. 65, page 441.)

The school of Epicurus had also dentifrices of their own, and we find a number of these in the writings of Galen, due principally to Apollonius, who, in a work now lost, *in primo parabilium libro*, treats of this subject specially; and later writers, among others Archanges, have also written on this matter.

The Romans, who received their knowledge of the arts chiefly from the Greeks, and in whose

steps they followed in their progressive march towards refinement, surpassing them even in their extravagant luxuriousness, brought the preparation of cosmetics to an art: their medical writers as well as their poets have left us sufficient proofs of this.

Celsus Scorbinus Largus, who lived fifty years before Christ, recommended roots of *farina nardi*, fomented honey, rock salt, and also, as another preparation, *herba arecolaris* dried and burned with salt, and one third part of *spicea nardi*, both of which mixtures were made use of by Octavia, the sister of the Emperor Augustus.

Galen gives also the prescriptions of Andromachus, Antiphanes, Aphrodes, Aristocrates, Pythius, Antipartes, and Crito; also a tooth-powder from Timocrates, and a poem on dentifrices by Democrites and Aurelius. This tooth-powder was that which was made use of by the too famous Messalina. Ovid, who may be styled the "ladies' poet" of his age, so much does he seem interested in the minutiæ of female toilet, in his "De Arte Amandi" advises his fair readers to clean their teeth regularly,—*Quid, si præcipiam, ne fuscet inertia dentes?*—and counsels those who would seek to subdue the hearts of men, not to approach them without having previously cleaned their teeth,—

> "Cui gravis oris odor, nunquam jejuna loquatur,
> Et semper spatio distet ab ore viri."

Martial, the satirist, so much feared by his contemporaries, in Epigram xli., lib. ii., does not hesitate to ridicule the discoloured teeth of Maximina,—"*et tres sunt tibi, Maximina, dentes, sed plane piceique buxeique.*"

Fescenia, who purchased of *Cosmos*, dealer in perfumes and vender of the celebrated breakfast *pastilles*, *jentacula*, which, as was the fashion of the day, were used to clean the teeth previously to partaking of this repast, exposed herself to the remark of Martial,—

"Ne gravis hesterno fragres, Fescenia, vino,
Pastillos Cosmi luxuriosa voras,
Ista linunt dentes jentacula: sed nihil obstat,
Extremo ructus cum venit a barathro."

We could continue thus to cite authors, if this could give more weight to our assertions, but we think that sufficient has been said to show that the ancients were fully alive to this our subject. We arrive, now, at a later period, when Pierre Fourchard, at the commencement of the eighteenth century, published his well-known "Treatise on the Teeth," the first special work on dentistry of importance, and one which has its value, even at the present day, and constitutes its author's chief title to be considered, in France, as the father of dentistry.

In the chapter on dentifrices he says:—"The

opiate powders and liquids now in general use for cleaning the teeth may all be considered as being rather injurious than beneficial to the teeth," and he adds: "I must warn the public against using them, and indicate the substances which enter into their composition." In describing these, he names: "Briggs's porcelain, pumice-stone (this wears out the enamel), salts of alabaster (the much-praised whitener of the teeth), cuttlefish bone, cream of tartar, salts of Saturn (acetate of lead), the juice of sorrel or of lemon, spirits of alum, of vitriol," etc. These last, he adds, should only be used as rare exceptions.

Unfortunately for Fourchard, he himself recommends: red coral, dragon's blood, cuttlefish bone and crawfish eyes, to be pulverized and mixed with honey. This mixture ferments considerably. From that which precedes, it may be seen that, during so many centuries, from Hippocrates to Fourchard, the compositions of dentifrices had made little or no progress, but that, on the contrary, the more general knowledge of chemistry has placed in the hands of charlatans the means of whitening the teeth, and, at the same time, of attacking their enamel.

Let us now turn, with some satisfaction, to our own more immediate period, that of true progress, and it is to be hoped, the regeneration of our profession, and ask ourselves this question,—Have we

materially advanced in the preparation of our dentrifices? Alas! no.

But this, I think, is, in a great measure, owing to the fact that most of our profession seem to think it beneath their dignity to occupy themselves with this subject; and they have, therefore, abandoned the field to the druggist and perfumer,—and what are the consequences?

It is true that we no longer make use of the burned bones of animals, eyes of crawfish, burned sheep's feet, and vitriol, but we can still read in a standard work the following formula:—

Pumice-stone,
Dried bones,
Red coral,
Calcined alum, and
Cochineal.

Add to this honey, and let it ferment 48 hours.

Fermentations are still, then, the order of the day. Of this we have abundant daily proofs.

We could, if it were necessary, mention several dentifrices still recommended by some of our best practitioners, but we prefer to indicate at once the principles which we think should now govern in the selection of substances necessary for the preparation of dentifrices.

We desire, then, to preserve the teeth from caries, and the question arises, What constitutes caries of the teeth?

The microscopical structure of the dental tissue and the changes which they undergo in caries have been for the first time minutely described by Mr. John Tomes. According to this author, acids are the principal cause of dental caries. The acid, after first destroying the vitality of the parts, decomposes them little by little; but notwithstanding this, we do not succeed in producing artificially, by the action of acids upon the dentine, histological changes like those which we observe on caries. Nevertheless, the decalcification, the softening, the destruction of the teeth, are all phenomena due to the chemical nature of the process.

Dr. Leber, now professor of Ophthalmology in the University of Göttingen, and myself, have published, in Berlin and Paris, a work on "Dental Caries, and its Causes."

We believe we have shown in the course of this work that the organic process is nothing, or nearly so, and that a parasitic element plays an important part in the production of caries. As our work, though translated and published in America, has not yet been issued from the English press, I will now lay before you a brief *resumé** of its contents.

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* The subject-matter of this paper from this point onwards having been already published in a separate work, it does not fall within the category of original papers. An abstract of its contents only is therefore appended. The original paper is preserved in the library of the Society, and may be consulted by any one who is desirous of so doing.

There is almost always found in the mucus of the mouth,* at the surface of the tongue, and in the interstices of the teeth, a whitish, cheesy substance, formed in great part by the *Leptothrix buccalis*.

In many parts the fungoid deposit takes the form of granulations, which are, according to M. Hallier, only movable spores in repose, which wander during a certain period in the liquid, but finally attach themselves somewhere, and increase by forming new articulations. If these observations are exact, as we are inclined to think, the movable spores resemble vibrios which are found in the mucus of the mouth, and possess the power of rapid movement.

In cultivating the *leptothrix* in the saliva, with the addition of sugar or any other appropriate liquid, we ordinarily see developed movable spores in numberless quantities, which are endowed with a power of very rapid motion. If the movements cease, which is observed on the edges of the preparation where it begins to dry, the spores resemble exactly the granular masses of the *leptothrix* which are met with in the mouth.

The presence of the *leptothrix* may be demon-

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* Mr. Bowditch, in examining the mouths of forty persons of different professions, and living different kinds of life, found in almost all vegetable and animal parasites. Those only were found to be free who cleaned their mouths several times a day, and at least once with soap.

strated by the violet tinge which is brought out by the application of iodine followed by dilute sulphuric acid.

In our opinion the progress of caries in the enamel is this: the enamel becomes porous under the action of an acid, and *leptothrix* enters the vacuities so formed.

Caries of the Dentine.

So soon as the enamel has been penetrated, destruction in the dentine commences with a softening decalcification, and accompanied by a brownish staining.

In the author's opinion all of those histological changes attributed to vital action are due to the proliferation of *leptothrix*.

Caries extends more rapidly in the dentine than in the enamel, a fact partly due to the development of a narrow-mouthed cavity, in which food, etc., forms a nidus for injurious fluids, but yet more referable to its tubular structure, the caries running far more rapidly along the direction of the tubes than across them.

Microscopic Changes of the Dentine in a Carious State.

We distinguish in dentinal caries two periods, which cannot be rigorously defined,—the preparatory *period of decalcification and softening*, during which the microscopic changes in question are to be observed; and the *period of direct decom-*

position. It is equally probable that the *leptothrix* exercises by its extension an active and direct part in the absorption of the carious tissue.

The superficial layers of disorganizing dentine, with the exception of some particles of food, are formed exclusively by the granular masses, and by the filaments of *leptothrix*. On removing these, we come upon layers which possess sufficient consistency to permit us to make sections. These latter consist of irregular minute fragments of carious dentine, of a brown colour. They are enveloped and united by masses of *leptothrix;* above all, granular *leptothrix*. In the layers which lie still deeper, the volume of the dentine increases; the *leptothrix* diminishes in such a proportion that the dentine here forms the principal part. We see, then, in the carious portions, coloured brown, irregular chinks and interstices filled with *leptothrix*, and its elements which, in the deeper portions, are always in a direction parallel to, or identical with, the course of the tubes.

The sections examined do not permit us to doubt that these fungi, by their extension, have deeply penetrated the dentine, and have not confined themselves to simply filling pre-existent cavities; and it is in this important respect that the observations of the author differ from those previously published by other writers, none of whom have noticed its extension into dentine not as yet broken down.

The development of the fungus seems to be favoured by a slightly acid, or even neutral medium, but it cannot develop itself in a strongly alkaline liquid, and if we draw our therapeutic conclusions from these facts, the prophylactic indications are :—the neutralization of the acids and preservation of the teeth from all fermentation, and the arrest of the development of the fungi by proper care and cleanliness. Well-formed teeth may be spared from caries notwithstanding great negligence, but teeth that are not perfectly formed can only be preserved from caries by great care; and, as we have already said, the teeth cannot be kept constantly clean but by the use of proper dentifrices.

The word dentifrice, from *dentes* (teeth), and *frico* (to rub), a purely mechanical action, has been, up to the present time, taken and followed too strictly to the letter. Most of the dentifrices that are prepared and sold now consist of tooth-powders. These can have only a purely mechanical effect, for the addition of vegetable powders, which are not soluble, can impart to them no medicinal action; but, on the contrary, these powders, such as myrrh, orris-root, Peruvian bark, etc., actually, so to speak, tatoo the gum in the same manner, though on account of their pale colours they are not so evident, as charcoal; and it is well known that dentists have often found,

even after the loss of the teeth, the gums tatooed as it were, from the use of powdered charcoal. In the composition of our dentifrices we must, then, first consider their object. As has been already said, it is to keep the teeth perfectly clean; to neutralize the acids, and to counteract all fermentation which takes place in the mouth; to preserve the mucous membrane free from that whitish, slimy coating which forms there; and to correct all unpleasant odour, whether proceeding from the teeth, the tongue, or tonsils.

We may advise, as useful for the purpose, the employment of soap, which, by imparting a slightly alkaline quality to the water, neutralizes the acids, and prevents the development of fungi. In many cases soap does not suffice to remove entirely the deposit formed upon the teeth; in such cases there should be added to it powders, but care should be taken that they are not too gritty; the disagreeable taste of the soap may be easily corrected.

We can also recommend the permanganate of potassa dissolved in water as an excellent mouth-wash, inasmuch as this remedy is a very excellent antiseptic, and at the same time the best means of preventing fermentation: this water exercises a beneficial action upon the mucous membrane of the mouth.

By proceeding thus hereafter, gentlemen,

rationally and scientifically in the composition of our dentifrices, we shall, I think, be making a move in the right direction, and I indulge the hope that some gentlemen of the profession will see fit, promptly, to give form and substance to the principles we have here developed, inasmuch as I can assure you that they are the results of long experience and of thorough investigation.

Discussion.

The President.—Dr. Rottenstein's paper has gone over a considerable amount of ground, but perhaps in our discussion it will be just as well that we should limit ourselves to the subject which forms the title of the paper, namely, the best dentifrices and the manner of using them. If we go into the histological bearings of his paper I think we shall find that we have more matter than the time usually allotted to such discussions will allow us to deal with. There is scarcely a practitioner present who is not frequently asked, "What is the best kind of dentifrice to use?" and I beg gentlemen to tell us, at all events, what answers they give.

Mr. Charters White.—I think that Dr. Rottenstein is quite right in advocating the use of soap as a dentrifice. It is, perhaps, the safest thing that we can use, and many patients I find use nothing else. For some years past I have been accustomed to recommend to my patients a dentifrice whose basis is soap combined with myrrh, orris, and a very little pumice-stone, but that must be used very cautiously. I saw a gentleman only last week who had been accustomed to use it twice a day, and I find his enamel is getting ridged and very thin. I decidedly condemn the use of it so often as that, but it stands to reason that the soap will neutralize that acid which will lodge in the crevices about the teeth, and so destroy them. Although the subject of Dr. Rottenstein's paper is apparently below the level of a learned society, it is one that we should bear in mind in our practice, and Dr. Rottenstein deserves our thanks for having brought it forward. I should like to hear the opinions of my brother practitioners upon it, because it is a very important matter, about which our patients frequently ask our advice.

Mr. Vasey.—I remember some time ago performing a few experiments with pumice-powder. I united several teeth with

a composition, making an artificial gum, and I brushed them with an ordinary toothbrush and pumice of different qualities for fifteen minutes. When I used the coarse pumice-powder very little effect was seen upon the teeth; but as soon as I used the levigated pumice I cut them right through into the pulp-cavity in fifteen minutes. It seemed to me that this very fine pumice cut the hard dentine just as diamond-dust cuts the diamond itself. I am convinced, from the experiments I made, that all hard substances are far more injurious when they are fine than when they are coarse. In recommending a dentifrice I do not think we can improve on that whose base is formed by precipitated chalk. I have generally recommended it, with a few grains of myrrh, which, being a gum, forms a kind of lather, and enables the powder to pass more readily over the teeth.

Mr. Underwood.—I agree with Mr. Charters White that this is a subject scarcely suitable for discussion at our meetings: it appears to me that we should look at the action of any powder as we do at that of soap in washing our hands. You can wash your hands more readily with soap than with clean water alone, and I think it is erroneous to seek for any other quality in a tooth-powder. All that you want is to have a sufficient degree of soapy characteristics. I always say to my patients, "Go to your chemist and get an ounce of precipitated chalk and use that." All that you want is that the powder shall have a little more action upon the teeth than the clean water has. I do not for one moment believe in the hygienic property of any powder.

Mr. T. A. Rogers thought frequent brushing, so as to prevent the lodgment of food for any length of time, of more importance than the use of tooth-powder. Still, under particular circumstances, and generally as age advanced, it might be well to use something of the kind. He might, perhaps, be pardoned for mentioning his own case, as that of a man who had reached half a century without losing a tooth. He had always used the brush four or five times a day; but with cold water

only up to the age of about thirty. He then found a little soap necessary for the perfect cleansing of the teeth; and, for the last ten or twelve years, he had used it in combination with precipitated chalk. He considered the soap useful as a mild antacid, and the chalk as a mechanical agent, keeping down any tendency which might arise to deposit tartar. But every practitioner must constantly have observed that some persons' teeth last well with very little care, whilst those of others are soon lost, in spite of all the brushing, with or without tooth-powder, bestowed upon them.

Mr. Sewill.—Dr. Rottenstein describes the fungus as being a cause of caries, but Wedl points out, in a recent edition of his work, which we are all familiar with, that this fungus has no active share in producing caries; and I think the most probable explanation is, that when the carious cavity is formed the fungus is deposited there; but it is not that which we have to deal with so much as the acid which gives rise to the caries. I think it is an undoubted fact that acid is the active cause of caries. Tooth-powders that neutralize acid must be useful in preventing caries, and with due deference to the experience of those members who have spoken, I think that something more active than chalk is necessary,—something which will pass readily into the carious cavities. It has been my habit to prescribe such things as carbonate of soda, and latterly soap.

There is a common article of commerce sold by the druggists, known as saponaceous tooth-powder. It is simply soap prepared with precipitated chalk for sale. The soap is dried in some way, pulverized, and rubbed up with chalk. In our present knowledge of caries the use of such preparations, containing a readily soluble alkali, promises better than anything else to assist in preventing that disease.

Mr. A. W. Barrett.—I think it would be well to be on our guard against one preparation that is advocated; namely, bitartrate of potash. That is advised by some, but I think rather unwisely, for it is decidedly acid. It has an acid

reaction, and its effect on the teeth is decidedly destructive. It tends to dissolve the phosphate of lime, and so to bring down the tooth structure, and I think ought to be condemned.

Mr. W. Merson.—The tooth-powder I recommend is composed of precipitated chalk, mixed with a small quantity of dried carbonate of soda and myrrh. This, however, acts purely mechanically, and I have thought it judicious to apply some astringent to the gums, and for this purpose have ordered a tincture to be made from the bark of the soap-tree, *Quilla saponaria*. This, added to a small quantity of tannin and eau-de-Cologne, forms a most agreeable and, I think, valuable astringent.

I order my patients to fill the brush half full of warm water, then pour on about twenty drops of the tincture, and brush the teeth and gums with it for five minutes. It produces a nice lather, and the feeling of cleanliness experienced afterwards is very satisfactory.

Mr. White.—If our discussion to-night had been upon grinding sections of teeth, I could have told you that there is no more active agent in reducing your section to the required degree of thinness than levigated pumice-stone. I have been in the habit of cutting down sections by putting this between two plates of ground glass, with water, and I am obliged to be very careful indeed in using this agent, for sometimes one turn more will destroy the section entirely. It acts, as Mr. Vasey said, like diamond-powder in cutting diamonds, and I should think it a very deleterious agent to mix with any dentifrice, in large quantities at any rate.

The President.—I think something like twenty years ago I bestowed a considerable amount of attention on the subject of dentifrices, and ultimately concluded to recommend my patients to use the precipitated chalk with soap. I found the best way to combine the two was to make the soap extremely dry, so that they could be worked up as a powder, flavouring it with whatever material the patient likes best. The denti-

frice was prepared by John Bell & Company, and I believe that saponaceous tooth-powder of this kind has been sold by the hundredweight. The value of soap, I consider, mainly consists in this, that it renders the mucus of the mouth quite soluble, so that it is washed away from the interstices of the teeth more completely than if the precipitated chalk alone were used. Since that time I have always been content to recommend the use of that kind of tooth-powder. I consider soap a valuable addition to whatever dentifrice may be used, simply because it renders soluble in water that ropy, tenacious mucus which abounds in some mouths.

Dr. Leslie said that Dr. J. Forbes, of America, had, after an experience of fifty years, advised his patients to make a solution of prepared chalk with alcohol. It was not so much necessary to rub a great deal as to take care that the points of the brush got into the crevices, and used before retiring.

Mr. Turner thought that if we could add to the tooth-powder which we recommend, whether soap or French chalk, something that would make it more palatable than it usually is, we might find that our patients used it more readily.

Mr. F. Henry.—It seems to me that the necessity for the use of powder arises with the tendency to the deposition of tartar in some mouths, and that, therefore, we only need a mechanical agent for the removal of that tartar. Where there is not that tendency I always shrink from advising the use of powder, having seen very serious results from its use, as no doubt many other gentlemen have, such as deep grooves in the teeth. I have even had to plug a tooth with gold because the groove was so deep. I have very little faith indeed in the use of dentifrices as a means of warding off caries, and therefore I do not care to recommend their use.

Mr. Oakley Coles.—I shall not attempt to reply to the observations that have been made, but I have myself the greatest faith in the therapeutic action of dentifrices if they are used

with that object. If you simply use a powder for the sake of cleaning the teeth, there is an end of the matter. If you have a congested condition of the gums and the teeth are very tender around the necks, I think it is quite competent for us to exercise a good deal of skill and knowledge in the choice of the materials that we may advise our patients to brush the teeth and gums with. In many cases where the teeth are spongy and inflamed, I use a tooth-powder composed entirely of chlorate of potash well ground up. There is sufficient grit in that form to cleanse the teeth, and as it is entirely soluble in the mouth, its deposition upon the necks of the teeth does no harm. It becomes absorbed, and its action on the gums is highly beneficial. In other cases I have not hesitated to order large quantities of quinine and precipitated chalk. I have found that exceedingly useful in two cases of prolonged neuralgia. I can offer no explanation of the facts; they may be simply coincidences, but in two separate cases of patients suffering from severe neuralgia—in one case for three years, and in the other case many months, one in the upper, the other in the lower jaw—after all other remedies had failed, and there being no evidence whatever of caries, I ordered a mixture of one ounce of chalk with a drachm of sulphate of quinine, more to give a diversion to the patient than with any hope of its being of use. You must take the facts for what they are worth, but the patients who used that preparation were completely cured of the neuralgia, and a long time afterwards I had a letter from one of them, stating that she remained free. How it acted I cannot say, unless it be that the neuralgia was the result of some irritation round the necks of the teeth from the development of fungi, and the quinine acted as a decided opponent to their existence, and so got rid of the irritation at the extremities of the nerves. That is the only possible explanation I can offer; but I can state as a positive fact that these were the symptoms, that the tooth-powder was ordered, and the patients got well. On behalf of Dr. Rottenstein, I am quite sure I shall be only expressing his views when I thank the members of the Society very cordially for the kind reception they have given

to his paper, and for the evidence that has been given of the interest taken in its subject by the number of members who have taken part in the discussion.

The PRESIDENT.—The thanks of the Society are due to Dr. Rottenstein, and will be conveyed to him in the usual manner, for his paper.

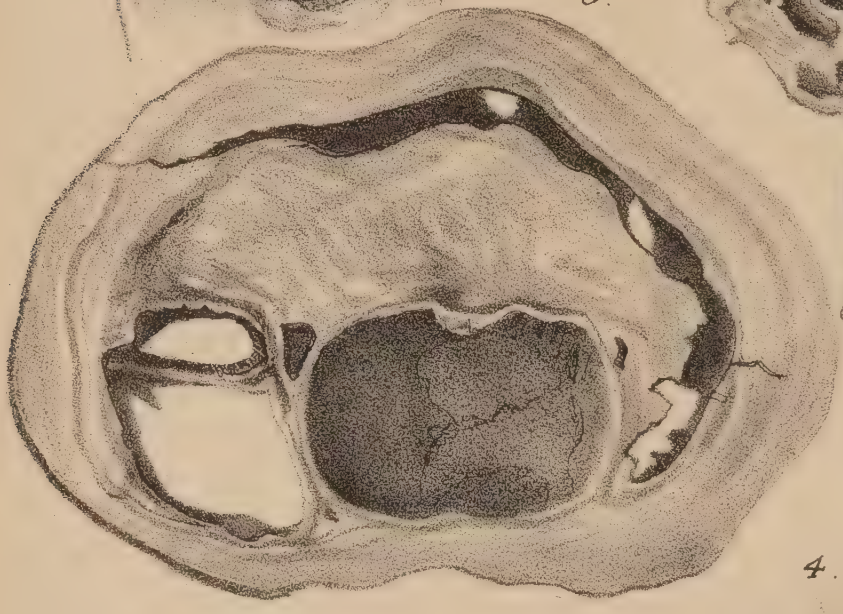
The meeting was then adjourned to Monday, March 1st, when a paper will be read by W. Bathurst Woodman, M.D., M.R.C.P., &c., on the Colouring Material of the Pink and Red Vulcanite, or Rubber, manufactured for the use of Dentists, and on some Cases of Chronic Poisoning apparently due to this pigment.

We are requested to state, that although, in reviewing the occurrences of the year, Mr. Sercombe's estimate of the numerical strength of the Society was not apparently borne out by the Treasurer's report, the discrepancy arose only from the fact that the Treasurer's report referred to the financial year of the Society which terminates on the 31st of October, while the President's statements extended to the termination of his year of office, January 11.—[ED. T. O. S.]

Plate IX.

1.

2.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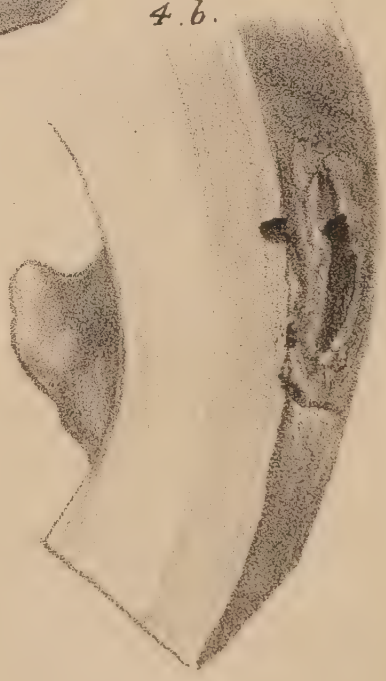
4. b.

Wyman & Sons, Lith. London.

PATHOLOGICAL SERIES.

PLATE IX.

RESULT OF INJURY DURING THE GROWTH OF THE TEETH, &c.

FIGS. 1, 2, 3, 4*a*, 4*b*.

THE so-called "abscesses" in dentine are but rarely met with in human teeth; the only recorded case with which I am acquainted being one described by Mr. Bell. But closed, circumscribed cavities, with no apparent outlet, are not very uncommon in the tusks of elephants, where they are quite unexpectedly opened by the ivory-turners, there having been no indication of abnormality upon the exterior of the tusk.

A very common cause of disturbance of the arrangement of the dental tissues in elephants' teeth is the entrance of a rifle-bullet into the growing pulp of the tooth; but these "abscess" cavities are to be met with sometimes in teeth which bear no other mark of injury; so that it is not quite certain that they are always dependent on mechanical violence. Fig. 1 (natural size)

represents such a cavity, and gives us a good idea of the peculiar mammillated appearance of its walls at that end. The cavity measures about $3\frac{1}{2}$ inches in length, and $1\frac{1}{2}$ in diameter, and is inclined at an angle of 45° to the long axis of the tusk.

The immediate walls of the cavity are formed of secondary dentine, or an irregular osseous tissue, varying in thickness in different places (the dark line in Fig. 1 marks the boundary of this tissue), and the contour lines of the dentine show some deflexions from their course upon its inner side, indicating that this part of the dentine was formed subsequently to the existence of the cavity.

The pathology of these cavities is but little understood; as was pointed out by Mr. Tomes, who first figured this specimen in his "Lectures on Dental Anatomy and Surgery," they are found to be lined by a dried-up fibro-cellular membrane, and their roundish, more or less regular form, also tends to support the idea that they once contained a fluid, which was doubtless pus. The abscess and its wall were situated at one time in a portion of the pulp, very generally at its periphery, often occasioning absorption of the dentine immediately adjacent; next calcification of the abscess-walls took place, and ultimately the whole mass came to be inclosed in solid dentine, by the further calcification of the rest of the pulp, in precisely the same manner in which a musket-ball or

a spear-head (of which latter two examples have been met with) come to be embedded in solid ivory.

Fig. 2 (natural size) affords a good example of the abscess-cavity in an earlier stage than that represented in Fig. 1 ; the immediate walls of the abscess are calcified, and are converted into a sort of coarse bone ; but as it is situated close to the open growing edge of the tusk, the thin free edge of which is seen at the top of the figure, it has not as yet had time to become surrounded by secondary or by true dentine. Had the animal lived, in the course of time the specimen would have assumed the characters of Fig. 1. One side only of the tusk is shown in the drawing; the smooth rounded surface of the calcified sac seen to the left projected into the pulp-cavity of the tooth.

Fig. 3 is a section (nat. size) across the same tusk at another point. The external thin rim consists of normal healthy dentine, while the pulp-cavity is in great part blocked up by secondary dentine. The smooth rounded cavity which is in the lower and central part of the figure, is the original abscess-cavity, the special calcified wall of which can readily be distinguished ; the other irregular spaces represent those tracts of the pulp which had not been obliterated by its conversion into osseous or dentinal tissue.

Microscopic examination of the surroundings of these cavities reveals evidences of alternation of

absorption and deposition; of excavation produced by giant cells or osteoclasts, and of their subsequent calcification.

Fig. 4*a* and 4*b* represents a curious ingrowth of dentinal tissue, which projects into the pulp-cavity of an elephant's tusk. At a corresponding point upon the outside of the tusk is a shallow depression obviously caused by the impact of a bullet, which has failed to penetrate; for near to it are indications of the surface having been splintered, and the splintered places having been subsequently rounded and smoothed down. Indications of disturbance in the development of the dentine around the spot are to be seen in the irregularity of those characteristic patterns produced in ivory by the disposition of the curvatures of the dentinal tubes.

GENERAL MONTHLY MEETING.

1st *March*, 1875.

J. TOMES, Esq., F.R.S., President, in the Chair.

The minutes of the previous meeting having been read and confirmed, the following gentlemen were elected Members of the Society :—

Ashley Gibbings, Esq., 119, Warwick Street, Eccleston Square, M.R.C.S.E., L.D.S., *Resident Member.*

Edward Moore, Esq., 2, Stanley Villas, St. James Road, West Croydon, *Non-Resident Member.*

The President then called upon Dr. Woodman for his paper, which he read as follows :—

On the Colouring Matter of the Pink and Red Vulcanite used in Dentistry; with Remarks on the Occasional Occurrence of Symptoms of Poisoning, probably dependent upon the Vermilion used as a Pigment. By W. Bathurst Woodman, M.D., M.R.C.P., &c.

Mr. President and Gentlemen,

The cases and remarks which form the basis of this paper were published, under the heading of "Hospital Reports," in the *Medical Press and Circular*, of December 9th, 1874; but having been requested by your honorary secre-

taries, Mr. Sewill and Mr. Turner, to embody the facts in a short paper for your Society, I was led to make some fresh experiments; and, in the meanwhile, one or two fresh cases, though of minor severity, have come under my notice. I owe to the kindness of Mr. Turner the interesting references to your own Transactions, and to American Dental literature, which form Appendices Nos. I.—V.; and I am further indebted to him for much valuable information on details of manufacture; there are also several suggestions of his which will appear in their own place in the course of the paper. My thanks are also due to my colleague, Dr. Barrett, Dentist to the London Hospital, for kindly favouring me with specimens of variously tinted rubber, showing me the apparatus used in hardening, and suggesting one or two of the later experiments. Before formally entering upon my subject, I wish to make two disclaimers, as due both to my audience and myself, viz.:—

Whilst I alone am responsible for the accuracy of the experiments; and although my first case was observed by me in 1862, when house-surgeon to the Torbay Infirmary, whereas Dr. Taylor's case was not noted till 1864,* and Dr. Well's case only one year before,† and up to the time of

* See his "Principles and Practice of Medical Jurisprudence," 2nd edition, vol. i. p. 290.

† See "British Medical Journal," September 5th, 1863.

my *writing* my first paper, I had seen no notice of such cases; yet, I am far from wishing to claim any priority as to the *discovery* of the facts. These personal matters appear to me of very small moment; and medical literature is so voluminous that it is scarcely possible to be sure of any such question of pre-publication. Dr. Sutro's case of poisoning by the vapour of vermilion seems to be one of the earliest in modern literature, having appeared in the *Medical Times* as long ago as September 27th, 1845. Here, however, it was used as a fumigation, for a cancerous breast. The references in the Appendix, kindly given by Mr. Turner, show that the danger was foreseen as long ago as 1859;—being combated by Mr. Putnam, and again in 1866, by Mr. R. Hepburn. It also appears that this matter is being eagerly discussed by American Dentists and Physicians. Here, however, I must remark that my first paper, though not published till December, was written several months before, and in the editor's hands before these American journals reached England.

My second disclaimer is of any wish to make a sensational matter of this question. It appears to me evident that the cases I am about to describe are more or less exceptional. In other words, whilst large numbers of patients are wearing and have worn these vulcanite plates for years, only a small percentage of them have suffered at all

severely, or perhaps suffered at all. But I believe the public look to you and to the medical profession to guide public opinion, to lead the way to improvements, and to obviate dangers and difficulties; rather than to be forced by popular prejudices, or made yield to any popular cry. Of one thing I am quite confident, and that is that your Society will give the matter a careful consideration; and will not only be ready but glad to welcome any substitute for vermilion, or even for rubber itself, which may prove more safe and equally convenient.

When my first case of "Ptyalism, rupoid eruptions, stomatitis phagedenica, and mercurial erythism," in a patient wearing one of these plates, was observed by me in 1862, I satisfied myself that the colouring matter in that instance was vermilion. When another case occurred in London, in 1864, I obtained a number of samples of pink and red rubbers, some by purchase in various quarters, whilst others were procured for me by Dr. Martin H. Payne, then in the Dental profession. I have lately examined a number of fresh samples, both hard and soft, that is, rubbers and vulcanites, or ebonites, as I think some call them, though that name is scarcely appropriate to the colours we are considering. One and all, whether pink or red, were coloured with vermilion, the red sulphide, or sulphuret of mercury. I do not profess to be an analytical chemist, at least

as regards *quantitative* analysis; but my experiments led me to the conclusion that the deeper tinted ones usually contained about one-third, or some 33 to 34 per cent. of this pigment,—a result which differs but little from that given in Appendix V. from the "Dental Cosmos," which states the percentage at 36 per cent. The proportion of pigment can only be approximatively judged by the colour, some very pretty and natural-looking specimens containing less vermilion than some which do not look so well.

Although certain natural resemblances in appearance and composition led me to believe that nearly all the rubbers used in this country were manufactured by some three or four, or at most, half a dozen firms, yet I must own I was surprised to find this mineral pigment in *all* the specimens examined (the total number of samples being nearly a hundred).* Mr. Turner, however, has given what appears to me a very reasonable explanation, which I suppose to be the *vera causa*, namely, that there is scarcely any other colouring matter known, at least of the desired tint, which would withstand the action of the H_2S, or hydrogen sulphide, and other sulphur compounds (such as SO_2) generated in the process of har-

* It is an act of only simple justice to Messrs. Ash to state, that the rubbers manufactured by them were the best and most evenly mixed with the pigment of all the samples examined.

dening or vulcanizing the rubber. I think I should be travelling out of my province as a physician and a clinical observer, were I to enter upon any description of the processes undergone by the artificial gums, palates, &c., in order to render them suitable for their destined purpose. There are gentlemen here who are familiar with the whole theory and practice of these matters; and I might perhaps be led into mistakes if I trusted to my hasty impressions, derived either from reading, conversation, or hasty peeps into dental *ateliers*. I may, however, without impropriety, allude to one or two little matters which have come under my notice in the examination of specimens, even although they be a little technical. I write as a clinical physician, and not as a scientific chemist, or a technologist. If, therefore, I am wrong in my inferences or theories, I shall be glad of correction. I think I am pretty sure of my facts, but shall be very glad for others to make independent observations, and hope some at least may be induced to repeat my experiments.

The *first* point I observed as to the rubbers supplied for dental purposes is, that the *basis* material was not absolutely identical in all the prepared sheets. It sometimes appeared to consist of india-rubber, pure and simple (I now purposely disregard the pigment), whilst other samples appeared to be mixtures of india-rubber with gutta-percha, and occasionally other vegetable

substances, whose exact nature I do not pretend to determine. I believe the juice of many tropical trees is used to mix with genuine caoutchouc or india-rubber. It appeared to me that these mixtures are important only so far as they affect the fineness and closeness of the *grain*, if I may use that expression, and the firmness and durability of the future product. I concluded from examination of the samples obtained by me (but here I speak under correction), that pure india-rubber, though perhaps not quite so hard as some of the mixtures, is, on the whole, best adapted for these purposes.

The *second* point is, that different specimens of the *hardened product*, or vulcanite, in other words, the gums and palates made by different dentists, and different workmen even, when broken across, or divided in any manner, varied very much in their texture. Some, and these, of course, were the best, were fine, firm, and close in *grain*, if I may say so, and showed scarcely any difference between the surface and the interior. Others had a porous, loose structure in the interior, were marked with little blisters and cracks on the surface, and in the midst of the spongy mass of the inside there were sometimes collections of the *pigment, pure and simple*, sometimes crystalline, sometimes amorphous. In others there were patches of Æthiop's mineral, the black sulphide of mercury, or sulphide with sulphur. I am told by Messrs.

Turner and Barrett that these faults are capable of being avoided by proper apparatus, and a proper way of working. I have been led to believe that in the provinces, at least, some dentists use only a common oven, by the side of a fire, or heated underneath, to harden their plates. Such a method seems to me very liable to lead to "faults" in the finished material.

It was, with one exception, "faulty" plates which gave rise to the cases of mercurial poisoning observed by me. In the exceptional case, an old lady referred to as Case III. in the *Medical Press and Circular* (*loc. cit.*), the plate worn by her seemed to me to be quite a finished specimen of dental art, and quite free from the "faults" referred to.

As to the pigment itself, it is only necessary, in an audience like this, to remind you that the red sulphide of mercury, now generally regarded as represented by the formula HgS, or 200 of mercury and 32 of sulphur (about 6 of the metal to 1 of the other element), is one of the oldest known compounds of that metal, being found native in Spain, the Balearic Isles, some parts of Italy, Austria, China, and the New World. The largest yield seems undoubtedly to be from the Spanish source of Almaden, in the province of La Mancha. From this, in one year (1827), some 1,100 tons of cinnabar and mercury were sent into the market. Next to this in im-

portance are the mines of Idria, in Austrian Carniola, yielding annually about 25 tons of cinnabar, and some 150 tons of mercury. Pereira quotes Theophrastus (de Lapidibus) as saying that cinnabar (κιννάβαρι) was accidentally discovered by Callius, about 90 years before the magistracy of Praxibulus of Athens—that is, 494 years before Christ, or some 2,365 years ago. There are, however, good reasons for believing it to have been known much earlier, since Geiger and others have found it in Egyptian tombs and ornaments of great antiquity. When first formed, artificially, whether by mixing sulphur and mercury together, or by precipitating mercuric salts by hydrogen sulphide, it is black, or nearly black, in colour; but in being sublimed, assumes the beautiful vermilion colour for which it is prized. The name of *minium*, now generally applied to red lead, was formerly used for this substance. The primary form of its crystals is the acute rhombohedron. Although Mayne gives its derivation from κιννάβαρι, the gum of an Indian tree, from a similarity of colour; it may, I think, not unreasonably be conjectured that this old name is derived from κίναδος, a fox, a red fox, to signify the colour; and βαρὺς, heavy, or weighty (as in the case of Baryta). The native product contains, amongst other impurities, slight traces of arsenic, in the form of sulphide chiefly. One or two of the samples of rubber examined by me

also contained traces of arsenic, but traces only. Red lead, sometimes used as a cheap substitute for vermilion, is not suitable for dental purposes, from its property of blackening by sulphuretted hydrogen. I have found no trace of this in any of the specimens.

Orfila, Mialhe, and other foreign toxicologists and pharmaciens assert that vermilion is an almost *inert* substance. They do so, chiefly on the ground that large doses, such as half an ounce or more, have been given to dogs without symptoms of poisoning. A similar argument might be used to show that calomel also is inert, since enormous doses have been given in cholera and other diseases, to human beings, with slight, if any, results. But the experience of the men who work the cinnabar mines, Dr. Sutro's case, mentioned before, and the experience of Surgeons and Physicians who use it in the form of vapour-baths for syphilis, tend to show, that in this form at least, it is anything but an inert substance.

Mialhe, in his "Chimie appliquée à la Physiologie et à la Thérapeutique," p. 396 *et seq.*, has shown, of calomel and some other mercurials, that, when exposed to the action of solutions of the chlorides of ammonium, sodium, and potassium, a certain portion is converted into the [per]chloride, or corrosive sublimate. He supposes the decomposition to be something like this :—

$$Hg_2 + Cl_2 + NaCl = HgNaCl_3Hg, \text{ or,}$$
$$HgCl_2 + NaCl + Hg.$$

Whatever the exact decomposition may be, it seems pretty certain that a small quantity of corrosive sublimate is so formed when vermilion is digested for some time with an alkaline chloride. This is possibly, and, I think, probably one of the ways in which the pink and red vulcanites prove injurious. I am not sure of the exact decomposition; it may probably be represented as follows :—

$$HgS + 2NaCl = HgCl_2 + Na_2S + S.$$

I have, however, found, as I shall again remind you, that bisulphide of mercury is capable of being sublimed at very low temperatures. But as regards the first method by which it may prove injurious, namely by decomposition and solution in the presence of heat and an alkaline chloride, I must remind you that not only are chloride of sodium and chloride of potassium present, though in small quantities, in normal human saliva, and under some special circumstances, such as catarrh and pneumonia, in abnormally large quantities in the altered mucus of the digestive and respiratory tracts; but that many of our patients use large quantities of salted provisions, or eat much of this condiment with their food.

Again, portions may be worn off the vulcanite plates containing the pigment, and carried into the stomach, there again to meet with chlorides,

and a temperature of about 38° Centigrade, or a trifle more. I must own, however, that in fair wear of well-constructed vulcanite plates the quantity worn off is very slight indeed. Perhaps some members of the Society can give us details of the actual loss of weight in plates worn for a given number of years.

More often, I think, portions of unmixed pigment escape from cracks or fissures, either in the solid form or in the shape of vapour.

It is noteworthy that in all my cases, and in nearly, if not quite, all those told by others, the symptoms of poisoning were first localized in the mouth. I think we must allow something for a slow process of molecular decomposition induced by the presence of molecules of water or saliva, aided by heat, the molecules of water being charged with electric forces. It is possible, too, that the carbon of the vulcanite, with the bisulphide of mercury and water or saliva, forms a constant battery, which is slowly but continually liberating mercury from the vermilion.

Whatever may be the way in which the vulcanite thus coloured acts injuriously, I think there can be little doubt that it sometimes does so. Upwards of a dozen cases have now been seen by me, and, as you see by the Appendices IV. and V., other cases are reported from America. Before enumerating the symptoms present in these cases, it may be as well to summarize the grounds

or evidence which induced and induces me to refer them, in the particular cases, to the use of pink or red vulcanite. They may be reduced to four, for the sake of brevity and clearness, viz. :—

(1.) The correspondence of the symptoms with those of chronic or sub-acute mercurial poisoning; coupled with

(2.) The absence of other adequate cause, or "sufficient reason," except the pigment in the vulcanite;—no other source of mercurial poisoning being discoverable in the shape of medicines, cosmetics, or otherwise.

(3.) The discovery of mercury in the *saliva* of some of the cases; in the *urine* of other patients; and, in one case, in both the saliva and urine. As may be readily imagined, there are difficulties in the way which prevent this analysis being performed in all the cases. Lastly :—

(4.) The remarkable agreement in the time at which symptoms appeared in most of the cases; from six weeks to two or three months being a usual period for the symptoms to become well marked; but above all, the *disappearance* of the symptoms when the vulcanite was removed, and their *reappearance* when the wearing of the plate was resumed. In Case V. of those reported in the *Medical Press and Circular*, this disappearance and reappearance happened more than once,—indeed, three times.

I do not propose to trouble you with details of

the cases, as they have been published at some length in the medical journal referred to. The whole of the symptoms which I myself have observed may be classed as follows :—

I. Muco-cutaneous symptoms, or those affecting the mouth, alimentary canal, and skin. Of these the chief are :—

(1.) Stomatitis, with sores of a deep, ragged, and spongy character, on the gums, cheeks, palate, and tongue; sometimes extending to the pharynx.

(2.) Salivation, usually profuse.

(3.) Great fetor of the breath.

(4.) A coppery or metallic taste in the mouth.

(5.) Anorexia.

(6.) Indigestion of an adynamic type.

(7.) Diarrhœa, somewhat resembling dysentery, like that sometimes exhibiting blood in the stools. This may, however, be preceded by constipation.

(8.) Herpetic eruptions about the lips.

(9.) Lichenoid and eczematous eruptions on the skin and mucous membranes, the papules and efflorescence in both cases being usually of a very vivid red, and attended with much itching and smarting (Lichen ruber and Eczema rubrum vel mercuriale).

(10.) In some of the cases there have been ecthyma, furunculi, pemphigoid and rupoid sores. With regard to the latter, it seemed to me that there was some doubt whether they may not have been due to constitutional syphilis.

II. General symptoms: the chief of which were:—

(1.) A general condition of malaise (this, perhaps, should come under the heading of neuroses).

(2.) Extreme muscular weakness, not unlike that of sea scurvy.

(3.) The blood became poor, watery, deficient in fibrine, the red-blood discs lost their tendency to adhesion; and the patients had a strong tendency to local hæmorrhages, such as epistaxis, melæna, &c., and also cutaneous ones.

(4.) A general conditon of feverishness: the state known as "mercurial fever."

(5.) Great feebleness of pulse, and weakening of the power of the heart, and of the intensity of the first sound of that organ.

(6.) Marasmus. In some cases the loss of flesh is very striking. In others, a lowlier form of tissue may replace muscle; and hence there may be corpulence, rather than a haggard appearance.

III. Nervous symptoms, of which the chief are:—

(1.) Irritability of temper in a marked degree.

(2.) Want of sleep; due in some of the cases to the itching of the skin, but present in some without any skin disease.

(3.) Extreme restlessness and mobility, with general hyperæsthesia; in other cases, or in a later stage, some anæsthesia.

(4.) Either hysterical symptoms, even in males; or great despondency, dread, and a condition closely allied to insanity; hypochondriasis in its worst form.

(5.) Illusions, and in some cases delusion;—thus, when the muscles are tremulous, the state closely resembles delirium tremens, in a mild form. (I may, perhaps, be allowed to remind you that in poisoning by the fatal ethyl and methyl compounds of mercury, the mind is still more seriously affected before death. In lead-poisoning, as well as in poisoning by arsenic, barium, and other metals, the mind is often affected.)

(6.) Trembling of the tongue and other voluntary muscles, as in gilders' palsy.

(7.) Loss of power in both upper and lower extremities, and loss of co-ordinating power, especially in the arms and legs. In one case the right arm was most affected, and as there were also cramps, the case resembled Scrivener's palsy. There was no local condition in this case to account for the writing-hand being especially affected. The patient, however, was a literary man, who used the pen a great deal. He was cured by leaving off the plate.

We must not expect to get all these symptoms in any one case. Usually we shall get the mouth and general health affected first with the slighter nervous symptoms. At a later date, and in more severe cases, the diarrhœa, hæmorrhages, emacia-

tion, and pareses, as well as the more marked mental lesions.

I now turn to the experiments made by me to try and elucidate the subject. They have been very numerous, including as they do, the examination of the many samples of rubbers previously mentioned. The result of these earlier experiments you know. The most interesting and most important of the others, in my judgment, are :—

I. Experiments showing the easy volatilization of vermilion, at comparatively low temperatures.

About three square inches of red vulcanite plate were broken up into small pieces, and different portions exposed (under water or saliva solutions) to temperatures varying from 100°—150° Fahrenheit (38°—65·5° Centigrade). After a few hours, even at the lowest temperature named, some vermilion was found on the bibulous paper covering the glasses.

In repeating this experiment care must be taken to keep the paper itself *cool*, as the cinnabar might be lost by a second volatilization.

A similar experiment was made with a whole plate having a fault, with a like result.

II. Experiments showing the solution of pigment in saliva :—

Portions of vulcanite plates, coloured with vermilion, were macerated in saliva for some days, at a temperature of 38° Centigrade (about 100°

Fahrenheit). The result was that on acidulating with HCl, electrolysis showed the presence of mercury by depositing that metal on a copper plate.

These experiments were repeated, and varied by the use of artificial saliva. Others were made with sulpho-cyanide of potassium alone. In weak solutions these were not successful. I did not consider the use of stronger solutions fair, as the percentage of sulpho-cyanides in normal saliva cannot be large. The total salts, according to Frerichs, do not amount to more than 59 parts in 1,000, of which the salts altogether only amount to 22·9, or less than a quarter grain per cent. !

III. Experiments to show the behaviour of vermilion in stronger solutions of chloride of sodium, &c.

I have already alluded to these, and to the use of salt as a condiment. I will, therefore, only say that I tried various strengths of saline solution (from 10 to 30 per centum), at a temperature of about 38° C. (100° Fahrenheit), digesting the coloured vulcanite in the solution for some days. The result was, that I never failed to detect mercury, apparently in the form of sublimate, by means of electrolysis. In the case of the strong solutions, a copper-plate was often sufficient, without a battery. I used the sodium chloride pure; but I think it is obvious that the commercial article is *more*, rather than less, likely

to produce a similar result. I varied the experiments by using potassium and ammonium chlorides, but the results were similar. I have previously given a probable formula for the decomposition.

IV. I made some experiments with acidulated saliva, and acidulated saline solutions, using acetic and hydrochloric acids. (I did not try lactic, although this might, perhaps, be worth trying, as well as phosphoric acid.) Except in the case of hydrochloric acid, I obtained no striking results. In the latter case, I am not sure that the hydrochloric acid really helped the solution. Although one might fancy this sort of formula—

$$HgS + 2HCl = HgCl_2 + H_2S,$$

yet, as a matter of fact, hydrochloric acid alone does not seem to act upon vermilion. These later experiments were, therefore, unfruitful. Inasmuch, however, as we are told by some chemical physiologists, that caustic alkalies exist as such in the blood, it might be interesting to note the effects of dilute solutions of these upon the rubber, aided by heat. The effect of strong caustic potash and heat being, as is well known, to liberate metallic mercury, which condenses in globules.

The last points to which I wish to draw attention are as to what can be done to remedy the evils I have thus pointed out.

The only suggestions I have to offer are the following:—

(1.) It appears evident to me, that great care in making the rubber first, and in hardening it after, so as to insure in the first a thorough mechanical mixture of the pigment, and in the hardened plates an absence of "faults" (cracks or fissures), would, undoubtedly, minimize the risk; although I had one case with a very well-made plate.

(2.) Several of the patients (some ten or more of my cases) had worn the plates all day long, and at night also. Some had not been careful to keep them clean. I doubt not that careful cleansing (in *soft* water, if possible), and leaving off wearing the plates at night, would very much lessen the dangers of such poisoning;—added to the occasional use of an astringent lotion for the mouth, such as myrrh with tannic acid.

(3.) It has occurred to me that it might be possible to glaze, or rather *glass* the plates over, when finished, with some one or another of the silicates; in fact, to enamel them. Even a varnish might, perhaps, last long enough to be worth trying.

(4.) After all, the great desideratum seems to be, to get a good substitute for vermilion; or, as there seem to be chemical difficulties in the way of this, for *rubber* itself. No doubt many will be sorry to lose such a material,

yet (although this is not the subject of my paper) there are some objections to rubber *per se*, and I fear there would still be some complaints about the rubber, even if we got rid of the vermilion. The contact of the rubber is too close, and its effects upon mucous membrane may be illustrated by the action of an india-rubber stall, when tight, upon the finger. Removing the plates from the mouth from time to time obviates this in part. But I believe, if we are in earnest, that good substitutes for rubber may be found—I mean, of course, equally cheap, or cheaper—and more healthy. I do not say "*Celluloid*," for of this I have no experience. It has occurred to me that in the case of large plates it might be possible to *perforate* the artificial palate, let us say, with small holes, admitting air freely to the mucous membrane. Such holes, however, would only *increase* the danger in vulcanite coloured with vermilion, or with any poisonous pigment capable of solution.

I must crave your pardon for the undue length to which this paper has extended. I have tried to render it as brief as is consistent with clearness, but still it is a bulky one. I hope some discussion of it will not only be permitted, but undertaken; and if there are any points I have not rendered clear, I shall be happy to give explanations at the close of the discussion.

APPENDIX.—No. I.

Extract from a paper read by Mr. Putnam, of New York, at a Meeting of the Odontological Society, held April 2, 1859. Vol. I. of the "Transactions," pp. 141—157. (Kindly pointed out by Mr. Turner.)

"It has been suggested that the use of vermilion in the material gives us in the piece one of the forms of mercury, and that with those *who cavil at trifles* [the italics are mine.—W. B. W.] serious objections would arise against its use. We reply, that if the work decomposes, wears away to any extent, or absorbs the fluids of the mouth *one jot or tittle* [these italics are in the original], which has yet to be proved, then I submit it for your decision as to what extent of injury can possibly arise to those who wear it?"

APPENDIX.—No. II.

At a Meeting of the Odontological Society, held June 4, 1859, Mr. Childs read a paper on "Superheated Steam," from which I extract the following:— (For this reference, also, I am indebted to Mr. Turner.)

"As the heating and hardening progress, the substance (rubber with sulphur) becomes darker in colour, one evidence of its being richer in carbon; it also gives out at the same time a great deal of sulphuretted hydrogen, that is, the hydrogen leaves the carbon and takes to the sulphur, forming a gas; and it is the formation of this gas which makes a certain amount of pressure necessary to prevent this gas forming globules in the rubber, which it will without pressure; and hence the porosity which is so often found in *sulphur and rubber hardened by dry heat.* . . . . I have also found that more sulphuretted hydrogen is evolved with the presence of saturated steam when under pressure than with sub-saturated steam, which is

accounted for by the rubber compound being slightly porous, and thus enabling a greater amount of moisture to act upon the rubber, and carry away more of the sulphur and hydrogen than is necessary; for water exerts the power, in an extraordinary manner, of decomposing all organic substances under heat and pressure; and further, also, as the pressure of saturated steam requires to be greater than in the case of subsaturated steam. If the heat be carried too far, a substance like charcoal is produced, very porous. . . . . I have learnt upon the authority of Messrs. Macintosh & Co., confirmed by my own experience, and some careful experiments by Mr. Vasey, that rubber will take up, with but little change of bulk, more than half its weight of impurities; if these be oxides, acids or caustic alkalies will readily decompose the compound with heat."—"Transactions," vol. ii., pp. 197, 198.

APPENDIX.—No. III.

At a Meeting held December 3, 1868 :—

"It might be well to take notice here of one of the greatest objections frequently urged against the use of vulcanite. I allude to the injurious effects it is said to produce upon the mucous membrane of the mouth of some patients, and even to affect their constitutions generally. It has been alleged that small ulcers, sores, and other symptoms of salivation, both local and general, have been exhibited after the use of rubber-cases, resulting, it is said, from the bisulphurate of mercury or vermilion, used as a colouring agent in the manufacture. . . . . So far as I have been able to inquire into the matter, I have not been able to detect free mercury in any of the numerous rubbers which have come under my observation. . . . I see no evidence to show that it can be acted upon by the secretions of the mouth, more especially when retained in combination with the hardened rubber compound. Even if it did so, I am not disposed to think that the small quantity which the surface of a rubber piece would yield could affect the mucous membrane or constitution to the extent which it has been stated these cases have

done. I must conclude, therefore, that the effects produced are due to other causes than to the presence of mercury in the rubber; to some peculiar idiosyncrasy in the constitution which would reject any other than a gold base in contact with the gums; or to some general derangement of the system at the time of inserting the piece, and quite independent of it. Such cases may, I think, be fairly classed with others of a similar character, which we have heard of in connection with the use of amalgam plugs, cases of which we hear, but happily never see, and which may be frequently assigned to other sources than those assigned to them."—From a paper on "Hard Rubber," by Mr. R. Hepburn, "Odontological Transactions," vol. v., p. 185. [This reference also was given me by Mr. Turner.]

APPENDIX.—No. IV.

From the *Pennsylvania Journal of Dental Science*, September, 1874, Vol. i., No. ix., p. 383. In reporting the proceedings of the Southern Dental Association, in session at St. Louis, July 28, 1874, it quotes Dr. Walker as saying, "that he had always been an uncompromising opponent of the use of rubber as a base for artificial teeth, and another year's experience had only confirmed him in his opinion on the subject. He preferred *celluloid* above all other material for that purpose. Regards the rubber as extremely injurious to the mucous membrane of the mouth, and poisonous to the system. He has seen many bad results, and in no case has he seen the good result we look for in artificial teeth. He had given the matter much and close study, and was satisfied that his position was correct. His own wife had worn rubber for three years, and the effect was to ruin her health. He was not convinced that this was the cause until he tried an experiment upon his own mouth, with a like effect. By watching the effects of the same agency in numerous other cases, he placed the matter beyond all doubt. Almost universally he noticed that it not only made the mouth sore, but it had such an effect upon health as to reduce the weight of the person

very considerably, the person returning to his normal condition as soon as the cause was removed." Dr. Judd found that the red rubber plate is far more injurious than black rubber, and cited an instance in which the two rubbers were mixed, the part touched by the black being comparatively healthy, while that touched by the red rubber was greatly irritated, and even inflamed. He knew of several cases where the disease had extended to even the bones of the mouth, completely destroying them (!). . . . . Let any one, no matter how healthy his mouth, place a small quantity of red sulphurate of mercury in his mouth, and allow it to remain for a while, and he will find the parts to become almost immediately affected."

Dr. Johnstone had seen some very serious cases of disease which have arisen from red rubber, and he has seen one or two cases of several years' standing, which were cured by simply substituting a metal for a rubber plate." Dr. Cobb, of Nashville, believed that disease arises more from the fact of a foreign substance being in contact with the mucous membrane than from the nature of that foreign substance. *He admitted, however, that there are more cases of disease with rubber plates than from silver or gold.* [Italics are mine.—W. B. W.]

A committee was appointed, with instructions to submit vulcanized rubber to a chemical analysis, and report at their next meeting.

[Mr. Turner kindly gave me this reference also.]

APPENDIX.—No. V.

Extract from the *Dental Cosmos*, Vol. xvi., No. xi. November, 1874 (Philadelphia, S. S. White, Publisher), p. 601.

Report of the American Dental Association, Morning Session, second day.

"The report then adverted to the action of the colouring matter in vulcanite upon the mouth, and its effects upon the health. There are two opinions : the minority think it highly injurious, while the majority claim that it is inert. Ver-

milion is six parts of mercury to one of sulphur, and forms thirty-six per cent. of the whole mass of rubber. . . . . The tendency to "flower," or appear in minute globules, may, by the globules being liberated by friction on the palate, and the decomposing action of light, free a small quantity of mercury, which being introduced into the stomach in a finely divided state might be acted upon by the acids there present, and the active chlorides of the metal produced. Some varieties are adulterated with arsenic, &c., to which the deleterious effects may be due. In such cases, however, it should be ascertained whether mercury has not recently been taken. It may, indeed, stay a long time in the system, and then suddenly manifest itself after taking, for example, the iodide of potassium."

[For this extract also I am indebted to Mr. Turner.—W.B.W.]

Discussion.

The President.—Dr. Woodman has brought before the Society a matter the importance of which, in a public or professional point of view, cannot be exaggerated. I hope that the many gentlemen present having a knowledge of the subject will contribute as concisely and accurately as possible their knowledge and their experience on this important question. The vulcanite or hard rubber has been so valuable in point of practice and, from my own point of view, so much better than anything that has preceded it, that we would give it up with great unwillingness. Still, if it should be shewn to us that it has the poisonous effects described by Dr. Woodman, I am sure we should one and all abandon its use.

Mr. Weiss.—I do not think it is possible for us to overestimate the importance of the subject that has been brought forward this evening; yet we ought to be exceedingly careful in jumping to conclusions simply because we find irritation of the mouth. Some years ago an Italian lady called upon me wearing a vulcanite piece made of the ordinary red rubber. It was strengthened with what appeared to be a gold plate. She had worn it for some time, but complained not only of irritation in the mouth but also of a disagreeable taste. I advised a discontinuance of the plate, and a piece was made in black rubber. The symptoms subsided, and I do not think I should have taken any further notice of the matter had it not been that, upon making a further examination of the work, I found that the plate with which it had been strengthened was made of brass gilded. It had no particle of gold in it excepting that which covered it externally. She had been wearing it about two years, and it was not until the gilding became worn off that the unpleasant symptoms commenced. We are all perfectly aware, as regards the hardening of rubber, that that can

be done as readily by dry heat as by steaming. Before I sit down I should like to remark that I think it very imprudent to employ the red or pink rubber in making blocks. Nothing can surpass for comfort the old bone block, particularly where it comes in contact with a mineral or a natural tooth. We know full well it is a common practice to employ vulcanite for these purposes, and sometimes we find, as no doubt many present have observed, that the red rubber is triturated away to a considerable extent, and that carried into the system. About ten or fifteen years ago I advocated very strongly the employment of silicated India rubber for the making of these blocks. I made a good many experiments at the time, and I was well satisfied that a good substitute for bone or rubber block could be constructed in silicated India rubber. It could be made to look sightly, and at the same time offered a greater resistance than ordinary vulcanite, being very much harder.

Mr. C. S. Tomes.—I rise early in the discussion to make a few remarks, my reason for so doing being that Messrs. Ash, who have gone into this matter with their usual energy, have placed in my hands a certain amount of material for communication to the Society, which bears so very strongly and directly on the question before us that I am anxious it should be before the meeting at an early period of the evening. The question seems to me to require consideration from two sides; the one the *à priori* possibility or probability of poisoning through this mercurial compound; the other, whether Dr. Woodman's cases are cases of genuine mercurial poisoning. I hope he will not think I am making anything like a personal attack upon his paper. The diagnosis of these cases is necessarily a matter of doubt oftentimes, which can only be cleared up by experiment and by a large number of cases; and therefore it is competent to other people to form a different opinion of the cases. First of all as to the *à priori* probability of poisoning, Dr. Woodman has mentioned the usual opinion, that vermilion taken internally is inert. No doubt it is perfectly inert; but that does not exactly prove that, taken in small quantities, and repeated indefinitely in small doses over a large space of

time, it would not prove poisonous. You might with impunity take a dose of salt of lead, but if you take it in drinking-water over a large space of time, you will get the poisonous effects. As to the effects of vermilion in fumigation, there is an opinion, supported by good authorities, that these effects are due not to vermilion itself but to the compounds resulting from the decomposition of vermilion by heat. Messrs. Ash, in inquiring into this matter, sent to the vermilion-makers, and learned from them that men engaged in packing vermilion, and who are red from head to foot, do not get any injurious effects from it. The experience of one of the partners in a firm which turns out enormous quantities of vermilion is, that for thirty years he had never known any poisonous effect to arise amongst those packers of vermilion or other workmen on the premises. That is a fact which appears to me of the greatest importance, and it is not negatived by the fact that workers in cinnabar-mines get mercurial poisoning, because there mercury is present in other forms than the inert form of vermilion. Any of us working at chemistry well know what an exceedingly refractory substance vermilion is. When you try to get it into solution, you ordinarily have to decompose it by means of heat. Another point is, the quantity of vermilion that can be worn off must necessarily be very small. The amount which could be rubbed off in a few weeks is infinitesimal. The average secretion of urine of an adult may be put at the least at 50 ounces a day. I am really at a loss to understand the quantity of mercury that Dr. Woodman appears to have found in the sample of urine when he says he found mercury enough to silver a sovereign, recollecting that 50 ounces of urine is passed every day. The quantity of mercury off a plate in a few weeks could hardly amount to a grain. Dr. Woodman lays much stress on mercurial compounds being volatile, and he relates an experiment in which he succeeded in volatilizing vermilion from a specimen of vulcanite under water. The experiment is a very remarkable one, and I am not able to explain it from a chemical point of view. Then he also speaks of calomel in the presence of chloride of sodium or chloride of potassium being decomposed partly, and forming a

soluble corrosive sublimate. Calomel is not a very refractory body. As is known to chemists, it is by no means difficult to decompose it by a great variety of agents. There is a great deal of difficulty in decomposing vermilion, so that the compari, son of the action of haloid salts in the two cases is not admissible and though Dr. Woodman suggests a hypothetical formula by which such a reaction might be explained, I would submit that the use of a chemical formula is not for hypothesis but for explaining and demonstrating reactions we have actually found to have taken place. Then again he suggests that saliva with vermilion in the mouth may form a voltaic battery perpetually decomposing vermilion. It may; but there is no experimental proof, it is pure hypothesis, and has no value as a proof of anything alone. Messrs. Ash, who are deeply interested in this question, placed the matter in the hands of Professor Attfield, Professor of Chemistry at the Pharmaceutical College, Bloomsbury-square. He made a large number of exceedingly careful experiments, which he has communicated in the form of a report, which will be probably published elsewhere. To some of his experiments I will now call your attention. Portions of vulcanized rubber, shredded into fine fragments were used for the experiment, and were kept in the solution for days and weeks, and tested at intervals, at a temperature in most cases varying between 96° and 100°.

1. Saliva, at ordinary temperature of air; no traces of mercury dissolved at the end of a fortnight.
(i.) Saliva, at temperature of 98°; three weeks, no result.
(ii.) Sulphocyanide of Potassium, 2 per 1,000 water
(iii.) Chloride of Sodium, 2 per 1,000 water
(iv.) Sulphocyanide Potassium, 1 per 1,000
(v.) Chloride of Sodium, 1 per 1,000
} at 98° for three weeks, no result
(vi.) Pepsin, 10 parts
Hydrochloric acid, 15
Water, 1,000
} (Artificial gastric juice) at 98° for three weeks, no result.
(vii.) Caustic Soda
(viii.) Caustic Potash
(ix.) Hydrate of Ammonia
} 5 per cent. solutions at 98°, no result.
(x.) Vinegar (5 per cent. acetic acid)
(xi.) Nitric Acid, 1 part to 5
(xii.) Sulphuric Acid, 1 part to 7
} for 6 hours daily at 98° for three weeks, no result.
(xiii.) Hydrochloric Acid, 1 part to 9; yielded slight traces of a metal, but in too small quantity for positive identification.
(xiv.) Spirits of Wine, 1 part to 3 water, no result.

The above results clearly show that no fluid met with in the body can decompose the vermilion and bring it into solution; and it remains unaffected even by far stronger reagents than any which it can encounter in the mouth. The rubber experimented upon was red and pink (in each experiment), taken at random from Messrs. Ash's stock. It is possible, however, that during the process of vulcanization, contact with other metals may set free a little mercury. Mr. George Ash, after inquiry, finds that the following base metals are used by some dentists to strengthen plates :— Gold, 18 and 16 carats, platinum, dental alloy, 9 carat gold, German silver, copper, iron, tin, lead; and to that Mr. Weiss, in the case he has quoted, adds gilded brass. If vermilion, at a high temperature, be exposed to contact with any of these metals, it will be decomposed, and mercury will be set free: the sulphur of the vermilion will combine with these metals. What will become of the mercury I cannot tell. I should fancy a very small amount would remain in the plate; but that is merely hypothetical. There are a few things, in reference to the cases mentioned in the paper, which strike me as requiring comment. In the first place, we are told a good deal about ulceration and salivation; but nothing whatever as to the possible sources of irritation existing in the mouth; nothing as to the existence of stumps or alveolar abscesses; not much as to the state of cleanliness of the mouth; though Dr. Woodman has remarked that all, save one, kept their mouths in a more or less uncleanly condition; nothing also as to the fitting of the plates. Then again, as to many of the symptoms which correspond very closely with syphilitic ulceration of the mouth, in which, by the way, I have often seen a most profuse salivation. In other forms of ulceration in the mouth, as ulcerated stomatitis, or in almost any case of irritation in the mouth, there will be a reflex irritation resulting in a flow of saliva. Pain in excavating a tooth will often induce a gush of saliva. So, in the same way, a more chronic irritation will induce a more or less constant flow of saliva. Of the cases reported, two are noted as being syphilitic. Those, in all probability, had been treated with mercury; but to what

extent does not appear. In the other cases there is no note made as to the presence or absence of syphilis; but it is not a matter which hospital patients usually tell you with great willingness. They will generally tell you "no" if you inquire *if* they have had it; but if you ask them *when?* they will tell you, probably, a particular date. I am rather at a loss, too, to understand the number of Dr. Woodman's cases. The number—a dozen—would lead one to the inference that this was a common thing. If it were a common thing, how is it that we dentists are not familiar with it? Some of us, surely, would have put two and two together, and coupled the appearance of these symptoms with the wearing of rubber plates. In Dr. Taylor's book on jurisprudence, he notes a case of spurious salivation which was induced immediately, simply by the insertion of a new set of teeth. In this case irritation of slight character in the mouth induced what was, to all intents and purposes, salivation, where there was no possibility that it could be due to any poisoning. It is quite possible that the appearance or reappearance of these symptoms is, in some cases of Dr. Woodman's, due to misfitting plates, or probably not to misfitting plates at all. I have seen within the last two or three days a case of ulcerations, having the characters of those seen in ulcerative stomatitis, occurring underneath a perfectly well-fitting gold plate; but the patient's mouth was not kept in a properly cleanly condition; and to that want of cleanliness I attribute the ulcerations in that mouth. A good many of the reputed sores, and so on, look as if the cases were purely syphilitic, and if so, probably have been treated with mercury. I do not agree with Dr. Woodman's comparison of a tight-fitting plate in the mouth resembling in its action a finger-stall on the skin, because the effect of a finger-stall on the skin is generally one of maceration, owing to the confinement of the perspiration; and I do not think you would get an analogous effect if you were to confine the secretions of the mouth; although if the plate were kept in continually, of course you would get unpleasant effects. Another thing struck me as remarkable in the case quoted by Dr. Judd, where a sort of party-coloured plate was worn, and irritation caused on the

points where the red rubber touched. Now if there is one thing we seem to know about vermilion more certainly than another, it is that it is locally an inert substance, whatever it may be constitutionally. It is well known that pure vermilion applied to sores does not produce any effect whatever. It is not an irritant, and I am at a loss to account for that case. It is a mystery to me, unless it be due to some peculiar physical property in the rubber. I cannot believe it was the vermilion.

Mr. Oakley Coles.—I have since the 27th of January paid some attention to this subject, and at that date I had the following different preparations of rubber put into the subjoined solutions :—

No. 1. Bow-spring rubber, unvulcanized—in a solution of common salt.
2. Ash's velum rubber (elastic), fully vulcanized—in hydrochloric acid.
3. Ash's pink rubber, vulcanized—in nitro-hydrochloric acid.
4. Ash's velum rubber (elastic), fully vulcanized—in nitro-hydrochloric acid.

After they had been kept at a moderate temperature in my consulting-room from the 27th of January, I, to day (March 1st) sent them to Messrs. Bell, of Oxford Street, and received the following report :—

"338, Oxford Street, *March 1st*, 1875.

"We have examined the liquids in the four bottles labelled 1, 2, 3, and 4. With Nos. 1, 2, and 4 there is no precipitate with sulphuretted hydrogen, but there is one from the solution in No. 3. From the small amount of precipitate, we have not been able to determine satisfactorily if it is lead or mercury, but we believe it is the latter.

"John Bell & Co."

As a matter of evidence, it seems desirable that this should be placed before the meeting ; and I think the source from whence the statement comes as to the result of the analysis will bear

such weight as to cause us to give it some consideration. I must confess, from my own observation, I have never seen any reason to come to the conclusion that vulcanite plates produced any injurious action in the mouth. I had two patients—sisters—who suffered from profuse salivation. They were highly nervous, and were always subject to some ailment or other. Their gums were exceedingly inflamed, and both of them wore rubber plates. I collected a quantity of their saliva; and having submitted it to my friend Mr. Tribe, I received the following report:—

"Royal Institution of Great Britain,
"*February 26th*, 1875.

"Both samples of saliva are free from mercury.

"ALFRED TRIBE."

There is one other point I should like to mention. I have been in the habit for some time past of using a fair quantity of elastic rubber, manufactured by Messrs. Ash, for making artificial velums. That rubber after a time is very apt to become soft in the mouth, and small fragments are broken away and swallowed by the patient; but in none of these cases, even where large portions have been taken into the stomach, have I had any evidence leading me to suspect that there was anything approaching mercurial poison. These are extreme cases, in which rubber is really taken into the system, and if the vermilion which the rubber contains be poisonous in its action, we might have expected to get some results from it. As a matter of fact, I have seen a number of cases of people who were anything but cleanly in their habits where there was not the slightest appearance of any approach to mercurial poisoning. There is another point, and one which seems to me of the utmost importance, in regard to the mistakes that may be made in arriving, not at the diagnosis of the condition of things, but at the cause of the condition of which a diagnosis is made. There is a case at the present time in the London Hospital, under the care of Dr. Stephen Mackenzie, of a girl, aged 22, admitted January 16th, 1875, with the following history:—Two months ago she was quite well, but

about six weeks ago had a pain in the lower part of the abdomen (the place pointed out is the right and left iliac regions) which got worse and worse, and for it she took "a lot of medicine." A doctor, on January 9th, said "that she had inflammation of the womb." For about ten days previously to admission she had headache, the pain being principally across the eyes. Before admission, several small spots formed on the gums, from which "matter came when they burst." "Clotted blood" also came down between the teeth; at other times "matter mixed with blood." Patient says she has very bad teeth, and often suffers from toothache and sore gums in consequence, but her mouth was never inflamed as it is now until about ten days ago.

Notes on Admission.

Patient's breath has marked mercurial fœtor; there is some amount of salivation, the saliva collecting in the mouth during examination; the gums red, granular, and bleeding between the teeth, many of which are mere decayed stumps; the tongue and lips are tremulous; the patient looks anxious and nervous, and the tremor has not the character of mercurial tremor, as seen in men working in mercury. There is slight tenderness about the neck and under the jaw, but no coarse enlargement of glands. The tongue is not swollen.

January 18*th.*—Patient's gums are very much better to-day; she has replaced her false teeth, four in number, which she was obliged to remove about a week ago on account of the soreness of her gums, and has only worn for a few hours together when on one or two occasions she was obliged to go out. There is still slight tremor of the tongue, but it is not so marked as on the 16th instant.

22*nd.*—For the last two or three days patient has called my attention to several small red spots around her mouth, which are very irritable this morning; there is one about the usual size on her forehead. The spots are about the size of a pin's head, raised, and of a pinkish-red colour, which extends to the skin around the base of each spot and fades away gradually,

having wholly disappeared at about two or three lines from the base of the pimple. Patient states that they come out more freely, and feel more irritable when she is hot, and that one night they came out all over her body and limbs, and the irritation prevented her sleeping.

January 23rd.—The spots are not to be seen which were out around her mouth yesterday.

February 6th.—Nausea, but no vomiting. Tongue bare of epithelium, in parts producing a very raw appearance.

The patient was suffering from some pelvic mischief—probably ovaritis—for which she had been energetically treated, presumably by mercurials.

(For the foregoing notes I am indebted to Mr. Mark Hovell.)

Now, sir, taking that evidence as it stands, and having the presence of a vulcanite plate, we should at once come to the conclusion that that patient was suffering from a well-marked case of mercurial poisoning. All the testimony, so far as it can be taken, is conclusive on that point, the more so as she gave no account of her ever having taken mercury. But, Mr. President, she was not wearing a vulcanite plate, but one made of dental alloy. And a case in point like this shows how careful we should be to have the most absolute proof that poison is being administered through an unmistakable medium before we can determine that certain symptoms are the result of a poison, which may have been present, but inert; in other words, we must have the most absolute proof that the poisoning is the result of wearing a vulcanite plate, before we can say, that because a patient exhibits symptoms of mercurial poison while wearing a vulcanite plate, that therefore the patient is being poisoned by the vulcanite plate.

Mr. Coleman.—Seeing the great service we are often able to afford our patients by means of vulcanite material, we are perhaps naturally inclined to regard the question now brought before us from a one-sided view; at the same time, it is remarkable that many of us who have had so large an experience in the employment of the compounds of rubber and

sulphur, coloured or otherwise, should not have met with cases at all similar to those described by Dr. Woodman. Recollecting from the period when the employment of vulcanite was first advocated at this society by Mr. Putnam, that the red compounds were coloured by sulphide of mercury, I have been naturally on my guard to look for anything which might be accounted for by their use. A few years after I had employed them, such a case occurred. A patient who had worn a gold plate with comfort, found a coloured vulcanite one to produce ulceration of the mucous membrane and mild salivation ; the plate was rough on its palatal surface and extremely dirty ; when polished, and afterwards maintained clean by the patient, all unpleasant symptoms disappeared. I have seen similar cases since, all depending upon the same cause, as no doubt have most of us, and remedied by the same simple means. Still some persons are so prone to salivation, that we cannot say that it is impossible to arise from the wearing of a porous or impurely coloured vulcanite plate. I recently saw a case where five grains of blue pill taken for a bilious attack, produced severe salivation, and I think it would be most desirable if this Society appointed a committee to investigate the subject, and if they should meet with any such case or cases, endeavour as far as possible to ascertain whether there were peculiar conditions in the secretions of the mouth, or otherwise, to explain the same, and enable us to guard against the evil we might inflict upon such persons. The excellent observations which have fallen from Mr. C. Tomes, together with the results of so able a chemist as Dr. Attfield, as quoted by him, are enough, I think, to satisfy ourselves that in employing vulcanite of pure material and properly manipulated we entail no risk whatever to our patients; but as Dr. Woodman has conveyed his impressions to another society besides our own, I think it is due, upon our part, to satisfy others besides ourselves on this matter ; at the same time we must thank that gentleman, not only for calling our attention to the subject, but also for the manner in which he has done so. I would propose, therefore, " that a committee be appointed to investigate and report upon the

question brought before the Society by Dr. Woodman, and that such Committee consist of Messrs. Cartwright, Saunders, Barrett, C. S. Tomes, and Turner."

Mr. Hamilton Cartwright.—I feel considerable diffidence in making any remarks with regard to Dr. Woodman's paper, inasmuch as I have lost the very great pleasure of listening to it, through an unavoidable engagement in the country, whence I have just returned. However, I am acquainted with its tenor, having read an interesting article by him in one of the medical papers a short time since; I must also, if I should be guilty of any plagiarism with regard to any of the criticisms of previous speakers, plead my absence in excuse, and beg forgiveness of those members whose remarks I may reiterate. The question now before us, as Mr. Coleman has justly said, is a most important one in every bearing, vulcanite being now in such extreme use. In a comparatively limited personal, but a large practical experience in my father's and Mr. Coleman's practice, of cases where vulcanite has been used, I have never yet seen one case in which it could clearly be proved that vulcanite was the cause of any of the abnormal conditions which have been described. Two or three cases which may be of interest present themselves to my memory now, and it seems to me that in relation to them there may be some few other facts which have not been sufficiently considered. Firstly, plates of various kinds are made use of under different conditions of the mouth. Occasionally you find that the mouth is very ill prepared before these appliances are adjusted; that is to say, loose stumps may be left here and there, all in a very unhealthy condition,—a condition in which the surrounding tissues participate; that alone being a source of much subsequent trouble, which is again aggravated by the presence of the plate. Then, secondly, there is another cause of which I have lately had an example, and that is the force of over-suction. It happened to be a case where vulcanite was worn; but I have also seen similar cases where gold was used. Some three weeks since, a lady came to me with a piece which was extremely well made; so much so that I told the patient that she had

no right to come to me. I was obliged, however, to assist her against my will, for it appeared the work had been done by some provincial gentleman, and having no opportunity of returning to him, she wanted present relief. In this case there were all the symptoms, as far as salivation went, of mercurial poisoning. The gums were very much inflamed, and she complained of transitory deafness and of constant singing in her head, and was altogether in a state of the greatest discomfort; so much so, that although this piece fitted so well—a consummation not always obtained, though always most devoutly to be wished—she could not wear it at all. She told me that directly she removed it she found that all these symptoms ceased. I made her understand the perfection of its fit. And I may mention it was of black vulcanite, though that, to my mind, is not of very great consequence in the argument. Thinking that pressure on the superficial nerves might cause the deafness and the singing in the head, I cut it away so freely that, instead of its adhering—it was in the lower jaw—as it had done before, it was simply kept in its place by clasps. I have seen her two or three times since: the salivation had ceased, the singing noise in her head had also stopped, and she is entirely relieved of all trouble. Again, another case occurs to me. A patient came to me at King's College Hospital to have a tooth removed, to which was attached a piece of that uncomfortable red-looking material which you often see in street show cases. Here, again, there were all the symptoms of mercurial poisoning. But there are two points to be recollected. This was a HOSPITAL patient, and, as we know, they are very liable to diseases to which I hope the more respectable part of the commuuity are not so obnoxious. Secondly, this was a piece of inferior material and almost completely porous. The plate was relinquished; she had several teeth stopped, and after three visits, these representing a period of ten days, the gums were in a very different condition, and nearly quite healthy once again. I believe that is the only case in which there was anything that would lead me to suppose that bad effects were produced by vulcanite; but even here uncleanliness was probably the cause. If so, this brings me to another question. There are some

patients who do not remove their pieces from their mouths. Mr. Coleman may recollect a case not long ago, of one who was a patient of his, which came to my hands incidentally. This gentleman was in the habit of never removing his piece; and here again were found all these disagreeable symptoms, such as the hypertrophied gum, a fetid discharge, ulceration, and the like. I did not see the patient afterwards, though I thought it a kindness and a duty to tell him that it was not a part of my professional duties to undertake the disagreeable task of such cases as his. Mr. Coleman may have seen him again, and if he has paid attention to the recommendation volunteered to him by me, his gums have probably become healthy. Finally, I should like to ask Dr. Woodman two questions: firstly, whether in any of the cases he had seen there were signs of over-suction; secondly, whether his cases have occurred in patients of uncleanly habits, or in those who, perhaps, through ignorance, have kept their pieces in contact with the mucous surface of the mouth without even removing them for cleaning purposes; and I would also ask him whether his experiences have been amongst that class of patients who, by reason of not being very well off, have been driven into the hands of such persons as those I have just characterised, whilst they are, at the same time, careless of personal cleanliness, and often the victims of diseases which may themselves, or in their necessary treatment, bring about such ills as Dr. Woodman would ascribe to the use of certain materials entering into the composition of vulcanite plates.

The President.—We have heard the opinions of gentlemen who have had a large experience in the use of vulcanite, and they have contributed the results of their practice to the meeting. We cannot, however, allow the discussion to drop without receiving the testimony of others, as yet silent, either for or against the material we are all so much in the habit of using.

Mr. Vasey.—I have much pleasure in saying that among the large number of cases I have treated with the vulcanite I have never seen any disagreeable results, except where the cases were

not properly attended to. I would, however, remind Dr. Woodman, in reference to one or two cases he mentions, in which the pieces seemed to be in good condition and fairly kept, that it is a very common practice with those who neglect their mouths and pieces to give them a good rub up before seeing the dentist. I should attribute the few cases under consideration to inattention to the mouth.

Mr. Sewill.—I have this week seen a well-authenticated case in which a patient was salivated by a single dose of mercury. That fact might account to some extent for the cases of poisoning that have been alluded to. I cannot trace all the symptoms Dr. Woodman has ascribed to mercurial poisoning to that source, more especially the eruptions not only of the mouth, but of the cheeks and the skin, which appeared to have the ordinary syphilitic character. I do not understand how the graver symptoms described could possibly arise from the minute doses of mercury which must have been taken in the cases. Were traces of paralysis really traceable to such doses of the poison? Dr. Woodman had seen vulcanite plates with cavities full of mercurial salts, and that might cause the local symptoms he had described. The London Hospital, being situated in the poorest neighbourhood in London, might perhaps present such cases.

Mr. Barrett.—I should like to ask Dr. Woodman one or two questions on this interesting subject; and that is, whether he has had an opportunity of weighing accurately the quantity of vermilion contained in a given number of average-sized pieces of vulcanite; because it seems to me a very important matter to decide that in the first instance, and we know pretty nearly, as dentists, what is the usual loss of vulcanite pieces. It may vary somewhat; but we can tell pretty nearly what will be the weight lost on each piece worn in the mouth. We could then come to the conclusion as to the quantity of vermilion taken into the body during a certain number of years, and so far settle the possibility of such an occurrence as that which is described. It is a serious matter—indeed, one so serious that I am at a loss to know how it is that we, as dentists, have

never met with these symptoms in the many cases that have been under our notice. It certainly has not happened in my experience during the last fourteen years, which is, I think, the period during which vulcanite has been used as the base of artificial teeth. With me it has superseded almost every other material; but it has not occurred to me to witness any such symptoms as those I have heard described by Dr. Woodman. I certainly have seen cases of irritation in the mouth produced by the wearing of artificial teeth, but if my memory serves me right, those cases have been more frequently brought under my notice when gold pieces and ivory were in use than they have been since the use of vulcanite. It is not an uncommon thing to hear patients who wore gold plates state that they would never use them again after wearing vulcanite. I agree with those statements that have been made in reference to non-cleanliness of the patients. There is also one other point. We know that vulcanite is most usefully employed in regulating plates. Perhaps there is no material so readily adapted to the cure of the treatment of regulating cases as vulcanite. In those cases we do unquestionably meet with a certain amount of irritation around the necks of these young teeth; but my impression is that this is produced mainly by pressure upon these teeth; and simply for this reason, that we find it produced at the backs of those incisor teeth which are pressed upon, and rarely do we find it produced round the necks of the molar teeth. If the vermilion of the vulcanite were the source of irritation, we should of course find it equal in all directions. As to the theoretical part of the subject, Mr. Tomes, jun., has so exhaustively spoken upon it, that it is unnecessary to say anything further on that point.

Mr. Dennant.—I beg to second Mr. Coleman's proposition for a committee. I have had one case of a patient, who was suffering from cerebral irritation, caused by concussion of the spine, and who wore a platinum denture, with which he suffered from a little over-suction. He also complained of the weight of the piece, and suffered from symptoms similar to those described, which followed the use of vulcanite. He (the

patient) was persuaded, against the advice of his physician, to wear a vulcanite plate; but after wearing one for eight or nine months, he had got great relief.

Mr. Weiss.—I should not have risen a second time had I not had a case the very reverse of those Mr. Barrett has been mentioning. The wife of a well-known surgeon in London had a vulcanite piece constructed of black rubber. She complained of so much heat and general soreness of the gum, that I considered it could only arise from fastidiousness. The teeth were kept thoroughly clean, and there was nothing in any way to account for the irritation; but still, I had her husband's testimony that as long as she wore this piece there was a continual feeling of heat in the mouth, an unpleasant feeling, which was never absent as long as she continued to wear it. I constructed a piece in gold, which she used instead of the vulcanite, and these symptoms subsided.

Mr. Turner.—Apart from the technical matters which have been introduced as to the decomposition of this poison, I think there are one or two things which may have tended to aggravate the cases which have come under the notice of Dr. Woodman, and which he has so kindly brought before us. It is most important we should know the probability of such circumstances arising, because the fewer they are the more likely is one to take us by surprise, and on that ground alone I think we are greatly indebted to Dr. Woodman for the manner in which he has brought the matter before us. In all probability the cases which Dr. Woodman has noticed have been from the inferior rubber that is so frequently in use; but there is a point which ought to be borne in mind in reference to this inferior rubber, and that is, that it is not only the way in which the rubber is adulterated, the inferior way in which it is worked up, and the inferior way in which it is cooked or cured by some dentists, but the inferior quality of the vermilion which may be used as a colouring pigment. That, to my mind, would supply a source of evil which would give rise to almost any symptom that has been described by

Dr. Woodman. We have heard to-night that arsenic is frequently present in vermilion; but there are other substances which we need not mention which are used deliberately for the adulteration of this valuable and expensive pigment, for the sake of the production of a cheap substitute. If such a character of pigment is used with this rubber, we can scarcely be surprised at the gravity of the symptoms Dr. Woodman has observed. Another point is, that frequently the rubber is used, as Mr. Weiss has reminded us, as blocks, particularly by the class of practitioners likely to use this inferior rubber. If it be so, and if this rubber is worn down by the trituration of the food, this question may be considered apart from the decomposition of the mercury in the vermilion. If this vermilion contains other poisonous matters besides the mercury, we have then a source of mischief which ought to be inquired into, and which may produce many of those symptoms which attracted the attention of Dr. Woodman. There may be one or two points also which would not attract the attention of a medical man. The conditions of the mouth have been referred to. But you often find a large number of amalgam fillings in a certain class of cases, and when you put the instrument on these fillings, although they may be very bright and glistening, they prove to be very soft. Perhaps the patient in whose urine the mercury was detected might have had some of these fillings in his mouth, which may have escaped the attention of Dr. Woodman.

The President.—Before asking Dr. Woodman for his reply to the various questions raised in the discussion, I may mention that in my own practice I have seen no evil result from the use of vulcanite, although I have used it freely for many years. I have a very intimate friend who by the smallest dose of mercury is profusely salivated. Once or twice she has been induced to take three grains of blue pill against her own conviction, and each time it produced profuse salivation; yet she has worn for years a red vulcanite plate without any injurious effect whatever.

Dr. Woodman.—I must confess that even should my

chemistry be proved to be wrong I should not be sorry, because I think some good will come out of this discussion. These facts are not all pure hypothesis. I have made a number of experiments, and I have certainly found the presence of what I believed to be mercury, although I may be wrong. The test on one or two occasions has been the production of the metal by a voltaic current, and then dissipating the mercury again by a spirit-lamp. I have spoken of silvering a sovereign. When I have silvered a sovereign, I did not silver it all over. I simply got an unmistakable silvery tint on the sovereign. My paper expressly states that only in two or three cases was the mercury found in the urine or saliva. There is considerable difficulty in making these experiments. The patient from whom I had the saliva gave me the contents of the spittoon for some days. In the other case the urine was saved in the hospital for many days. There are considerable difficulties in the way of doing it, not only in getting the patients to furnish you these things, but in analysing them afterwards, owing to the bulk. Still, I have made the experiments, and I must say I believe in them. If Dr. Attfield will repeat the experiment with strong enough solutions of chloride of sodium, and with commercial vermilion, I believe he will find mercury in the solution. It is possible that pure vermilion may not yield it. My chief experiments were made on vermilion derived from these plates. I believe the point is not disputed that the rubber is tinted with vermilion; and I do not think I am very far wrong in the proportion alleged. I am not an analytical chemist; but I believe they contain very nearly one-third of vermilion. That is the opinion of American physicians also. I do not say it is an easy thing to get the vermilion out except by saline solutions. I used nitro-hydrochloric acid to test for it in the rubbers. The rubber is entirely dissipated after a time, and I believe there was scarcely any organic matter left. There are two or three points raised by those gentlemen who have spoken, to which I think I must allude. First, I have been asked about paralysis. Anything like absolute paralysis I have never seen. Loss of power I have, and loss of sensation, but not anything like true paralysis.

We must not expect to get all these symptoms in a single case. I have already anticipated the remarks made about want of cleanliness, and that is perhaps the case with nearly all the patients. They wore the plates a long time; and perhaps the plate that was so well made was a very close-fitting one, and there may have been over-suction. But still, the longer the plate is in the mouth, if the vermilion is dissolved in any way, the more likely it is to produce the symptoms. With reference to amalgams, I think it is quite possible some of the patients may have had amalgam in the mouth, although I would not be quite certain about that. One almost requires a special training to be quite sure of not overlooking anything. I may say, with regard to syphilis, that I have mentioned it expressly in some of the cases, and it has been doubted whether the sores or skin diseases were not produced by it; but the characteristic eruption is very different. It is a very bright red, which continues. The syphilis spots come out pretty red, but do not last long. The other spots last a long time, and the amount of inconvenience caused is very different from that caused by syphilitic eruptions. The lichen and eczema are very different from syphilitic lichen, &c., and keep their bright colour for a long time. In reference to inferior vermilion, I think it quite possible that red oxide of mercury is used in some cases to adulterate it. I have not gone sufficiently deep into the point, but in some cases I suspect the red oxide has been used to adulterate it. Whether in the subsequent processes undergone by it it would remain red oxide, I cannot say. I do not know whether the intense heat, and so on, would keep it. It is very desirable that these points should be investigated. I must confess I believe that a certain proportion of vermilion does undergo solution. I saw to-day a plate that had been worn many years. The plate was quite red when it was first put into the mouth, and it then became black. That black I believe to be Ethiop's mineral, although I have not made sufficient examination of it, but it is certainly not confervæ; showing that some change had gone on in the mouth. Then there is another point. I think I have alluded to the weight of mercury in the rubber when vulcanized as

being about a third per cent. I think that will be found nearly right. Then the question as to porous plates I have already anticipated in my paper. As to the number of my cases; there were twelve when the paper was written. Since that time there have been three milder cases, one of them remarkable for having no special symptoms except that the man, who is now dead, was never well again afterwards. He had previously some degeneration of arteries and certain heart and kidney lesions, which you will say were enough to kill him. The curious thing is that up to the time of wearing the plate the man was feeling quite well; but after that he was never well again. There was another fact. The man had mental anxiety afterwards, which might have had a good deal to do with it; but I have met with two or three cases simply with a general condition of bad health, malaise, and no other special conditions; but these patients wore the porous plates, and there was a want of cleanliness, and they wore them at night; but that does not take away from the mercurial character. We should not take one or two mercury symptoms; we should take them all together, and that will settle the mercurial character. I have gone into the question of cosmetics and vegetable medicines. Every medicine that is called "vegetable" is sure almost to contain mercury. It has been said that many patients are easily salivated. When I was an apprentice I got into trouble by giving a lady mercury. I was quite certain I never prescribed it, but we could trace that she had had a small dose of mercury in this way:—the calomel pills of another patient were made up on the same slab. There were only two pills, but the slab was not washed. She might have had about half a grain in all of calomel, but she was exceedingly susceptible. Twenty-five years before a similar thing happened to this lady from an exceedingly minute dose. Then it was no more than three-fourths of a grain, because she took one pill instead of two. Some patients are no doubt very susceptible, but we must be prepared to meet those cases. I hope the Society will give me credit for no unworthy motives in this affair. I have come here without making any reflections whatever on the good faith of the manufacturers or users of

this article. I only felt it my duty to point out one or two things to the Society in connection with this subject.

The PRESIDENT.—In order to show Dr. Woodman how much we are indebted to him for his paper, and how much we are in earnest on the subject he has brought before us, I will put Mr. Coleman's motion before cordially returning him our thanks :—"That a Committee be appointed to investigate and report upon the question of mercurial poisoning by coloured vulcanite, as brought before the Society by Dr. Woodman ; and that the Committee consist of Mr. Cartwright, Mr. Saunders, Mr. Barrett, Mr. Tomes, jun., and Mr. Turner."

The resolution was carried unanimously.

The PRESIDENT.—Dr. Woodman: I have now only to return you the thanks of the Society, and to express to you its deep obligation for the manner in which you have brought forward a most important subject, and for placing before us matter with which we certainly are not altogether unfamiliar, but matter which deserves the most careful consideration, both from a professional and public point of view, and which, at the hands of this Committee, will, I trust, be very fully investigated.

Dr. WOODMAN.—In thanking you for your kindness, and for the way in which you have received the paper, I will say that, if any more cases occur to me, I will take care to bring them before the notice of the Committee.

The Meeting was then adjourned to Monday, April 5th.

GENERAL MONTHLY MEETING.

Monday, April 5th, 1875.

GEORGE BUCHANAN, Esq., Vice-President,
IN THE CHAIR.

The Chairman.—In occupying the chair this evening I must crave your indulgence. I esteemed it a high honour to be appointed Vice-President of the Society, little thinking, however, that on my first visit to town I should be called upon to preside at the meeting of the Council and also at the general meeting. I assure you I esteem it a very high honour. I never anticipated occupying this position, and must crave your indulgence for any shortcomings this evening.

The minutes of the previous meeting were read and confirmed.

Walter John Woodman, Esq., of 50, Marquess-road, Canonbury, Islington, N., was elected a resident member.

Mr. Charles Tomes exhibited a specimen of an odontome extracted by Mr. David Hepburn, and announced that the Society had received a donation of skulls from Mr. O'Meara, of Simla.

Mr. Frank Henry.—The subject of the case which I wish to bring before the Society is a little girl eight years old, who,

early in the summer of last year was taken to a dentist with pain in the left lower molar. He removed the tooth, and the child returned home, having expressed a feeling of great pain at the time of the operation. The pain was not relieved; on the contrary it was very much increased; and the face began to swell considerably. The parents paid no particular attention to the case, thinking that, the tooth having been removed, it required none. I understand that poultices were applied freely, to relieve the swelling. Mention was made of it to a surgeon in the neighbourhood, who simply prescribed, without seeing the child. The prescription having taken no effect whatever, the surgeon then saw the child, and the face was in a dreadfully swollen state. The mouth could scarcely be opened, and on attempting to open it for examination, an abscess burst within. Two days afterwards, when the surgeon saw her again, sloughing had taken place to an enormous extent, and a hole appeared in the cheek through which, he said, one could pass a hen's egg. Another medical man then saw the child, and treated her for the purpose of filling up the external opening. I should have said that, when the former surgeon saw the child after the sloughing had taken place, he removed from within the mouth two or three pieces of necrosed bone. I had the opportunity of seeing the case for the first time after this, when, some weeks after the sloughing had taken place and the opening had become considerably reduced, the case was brought to my father for mechanical assistance, which proved to be out of the question. He suggested that probably a plastic operation would be necessary. With that idea, and thinking the case a very interesting one, I took the child to Mr. Salter, of Broad-street, who said it certainly would need a plastic operation when the wound had healed. On examination, he found that the cheek had cicatrised down to the jaw, puckering the mouth very much, and greatly disfiguring the child. She has lost great substance in the cheek, so that the face is not by any means symmetrical in the full view. Upon examination of the model, it will be seen that a great portion of the jaw in the vicinity of the molar and bicuspids has been lost. I imagine from that, that the capsule

of the second bicuspid at least, if not also of the first, had been removed with the pieces of bone. It occurred to me, from the first time I saw the case, that most of the mischief externally arose from the too free poulticing. I may be wrong, but I fancy that the sloughing would not have occurred to such an extent if the poulticing had not been resorted to. I am aware that the case is not unique, but think it of sufficient interest to bring before the meeting, as it may be a warning to us that serious accidents may occur in the simple operation of tooth-extraction.

Mr. Coleman.—I have two objects to bring under the notice of the Society: the first is a dental bag constructed by the Messrs. Arnold, surgical instrument makers, of Smithfield, and is upon the same principle as their obstetric and anæsthetic bags: they open on each side from the centre, and the sides fall down flat upon a table; thus at once rendering the contents available for use without the necessity of first removing them from the bag. Besides having accommodation for almost everything a dentist might require when called upon suddenly to visit a patient, there is included a twenty-five gallon bottle of liquid nitrous oxide, bag and face-piece. The second is an apparatus I have now used for some time for administering nitrous oxide in combination, or not in combination, with ether. The leather straps which surround and support the mahogany box when carrying it, are available for firmly fixing it to a chair or smal table. The reservoir, a hundred or fifty-gallon bottle of liquid gas, is fixed in the box by an iron clamp and screw. The lid of the box is made to slide, instead of to open with hinge, which latter renders a box when open spacious and unsteady. The lid slides with the reverse side up as well, and supports a bottle containing ether: this bottle is so connected with the gas-reservoir that upon turning a stopcock, the gas on its way to the bag (of capacity of almost two gallons) can be made to pass through the ether or not, as desired. When employing the nitrous oxide and ether together, I give about one and a half gallon of the former, and then turn it through the latter. I find it greatly prolongs the anæsthesia, and do not believe it increases the

danger to any extent. It is not placed in comparison with the admirable arrangement of Mr. Clover, but is a much simpler and cheaper apparatus. It contains all an anæsthetist is likely to require, including œsophagus forceps, tracheotomy instruments, &c.: the latter hint I have taken from my friend Mr. Cattlin, who has them always ready at hand. The box arrangements have been carried out for me by the Messrs. Barth. I must say one word upon the danger of employing the mixture of ether and nitrous oxide by artificial light, it being about as explosive as a mixture of coal gas and oxygen. Mr. Coleman then filled a soda-water bottle with the mixture, and exploded it with a taper.

Mr. Charters White.—I wish to ask Mr. Coleman if there is any provision made in the bag which he has exhibited for carrying the Cattlin's bag and face-piece, or must they be carried as extra parts of the apparatus? It seems to me that space might be arranged to carry them.

Mr. Coleman.—There is room for carrying a small bag. I do not know that it need be as large as Mr. Cattlin's, and there is also room for a face-piece. With regard to the price of the bag, I may say that it is not yet perfect, and the manufacturers are therefore not yet able to state the price. When it is completed, they will invite the editors of the journals to insert a woodcut of it, with particulars.

Mr. Sewill.—The specimen which I now hand round is perhaps worth showing, before it goes into the Museum, on account of its great rarity. It is a specimen of calcification of dental pulp. In January last the patient was brought to me under the following circumstances. In June, 1873, she had received a blow on the mouth from a stone, which broke the crown of a central incisor. She was about fourteen years of age. Within twenty-four hours she was seen by a dentist, who directed that the tooth should be left in its then condition, and not interfered with. His advice was followed until the patient applied to me. She was brought to me because, after the lapse

of a few months, the gum had grown forward, protruding between the fractured parts of the crown, and was producing considerable deformity. On examining the tooth, I found a vertical fracture through the crown, with a piece of gum occupying the space between the divided fragments. The fractured portions of the crown were very loose, and I removed them. They were so loose that they could be picked out with the finger. On examining the root, I judged it expedient, considering other circumstances, which I need not detail, to extract it also. I then found the condition which is here displayed, that is, a complete calcification of the pulp exposed by the fracture. The pulp appears to have prolapsed to a small extent, or some exudation has taken place over the surface, since the fractured portions of the crown now will not inclose the calcified pulp. I do not think the case requires any remark, except that it suggests this inquiry: If we get in one case, say out of a thousand, calcification of the pulp under these unfavourable circumstances, how is it that we do not get it more frequently after we treat it with the care and the scientific attention which we are able to bestow on cases where the pulp is exposed by caries? Calcification of pulp exposed by caries in my experience is very rare, and that appears to be a very unaccountable fact in the presence of even one instance of this kind.

The PRESIDENT then called upon Mr. Charles Tomes to read the paper of the evening.

Notes on the Introduction of Water-tight Fillings.

By Messrs. F. Ewbank and Charles S. Tomes.

Mr. President and Gentlemen,—

The authors, while fully aware that the comparatively small number of experiments made by them, as well as the many sources of fallacy which track such inquiries, prohibit them from drawing very positive conclusions, nevertheless think that the results obtained, after the exercise of due care in considering the more obvious sources of error, may prove, at all events, suggestive.

Most of the fillings, except where otherwise specified, were in difficult cavities; when practicable, freshly extracted teeth were used, but in some instances teeth which had been allowed to get dry had been soaked in water for several days and then used.

They were in the ink-bottle (Draper's Dichroic Ink) for at least twenty-four hours, and often for forty-eight hours, or more. In all instances they were placed in the ink immediately upon completion of the filling.

In none of the experiments were the interiors of the cavities varnished with carbolized resin or any other similar preparation.

Hill's Gutta-percha Filling.—To the authors'

surprise, they have uniformly failed to make a filling which resisted the entrance of ink with Hill's gutta-percha.

They have inserted it in easy as well as in difficult cavities, with and without the previous application of chloroform to the walls; and in all instances failure has resulted.

Oxychloride of Zinc.—Under all circumstances absolutely water-tight fillings were obtained.

Palladium.—As a rule, perfect results were obtained; but in one cavity, exceptionally unfavourable in form, a slight leakage occurred.

Fletcher's Platinum and Gold Amalgam.—This was employed so dry as to be in the form of an almost black powder, and packed with a plugger. It was employed also in every intermediate condition. The excess of mercury upon its surface, when present, was sometimes dried off with gold or tin foil, sometimes not; but the authors have only failure to report.

Fletcher's Expanding Amalgam.—This has invariably been employed in a somewhat soft condition.

The results have afforded a high average of success. Leakages, when they have occurred, have usually been partial; and in situations where, from the form of the cavity necessitating the insertion of a contour filling, there was no opposing surface to keep the filling from changing its position.

A few experiments were made upon the change of the specific gravity of this amalgam in passing from the plastic to the solid condition. Its contraction, though invariable, was found to be less than that of other amalgams experimented upon.

In composite fillings (*i. e.* fillings commenced with soft foil and completed with that which has been strongly annealed) that portion of the cavity which has been filled with soft foil has in all cases proved to be absolutely water-tight.

In several instances, where the cavities have been completed by the use of highly annealed heavy foil, or thin annealed foil used rapidly, the staining caused by the percolation of the ink has exactly mapped out those portions which the operator had noticed to have been covered by soft foil, the success of the soft foil having been absolute, the failure of the highly cohesive foil no less complete.

Highly Cohesive Foil.—In all cases but one, the cavities were such as could hardly, if at all, have been filled with soft foil.

In the one case a small circular cavity was rapidly filled with a rose head drill nearly as large as the cavity with a perfectly satisfactory result.

In cavities of exceptional difficulty, by the use of very small pieces of gold, small points, and (in all cases but one) of an automatic mallet, absolutely perfect results were obtained.

In one instance there was a slight and partial

leakage: this occurred in a dried tooth, not moistened at all prior to the introduction of the filling.

But this high degree of success was only obtained by a very great expenditure of time and patience.

Whenever the attempt was made to use highly cohesive foil more rapidly, whether in the form of heavy foil or otherwise, failure was the unvarying result.

Discussion.

Mr. Charles Tomes.—The experiments which have been made in leisure moments by Mr. F. Ewbank and myself, and which we have laid before the Society this evening, although not sufficiently numerous for us confidently to say that the results which we have obtained are conclusive, have, however, been sufficiently numerous to apparently tend towards definite results; therefore we have thought that they might be interesting to the Society. They are communicated simply as a series of experiments, and we have little to add to the bare relation of them. Almost all the fillings were made upon what might be termed difficult cavities; that is to say, they were fillings that might be described as more or less contour fillings, in which there were not strong walls round the cavities; and for the most part they were made in fresh teeth when we could procure them. A certain number were made in dry teeth which had been soaked in water for at least three or four days before our using them. We were not able to detect any difference in the results when we experimented with dry and with fresh teeth. Some of the successes and some of the failures were in each. With oxy-chloride fillings we met with perfect and invariable success—they were always water-tight. With Hill's stopping with gutta-percha we were invariably unsuccessful in making water-tight fillings—very much to our surprise, inasmuch as the value of Hill's stopping in the mouth, and the complete way in which it preserves the teeth from decay, are familiar to us all. We did not confine ourselves to very difficult cavities, but, failing in these, we tried easier ones. We tried every combination and condition known to us; we put it in very hot and moderately hot; we washed out the cavity with chloroform and we did not wash it out. I may also add that Mr. Coleman made an experiment with Hill's stopping, using it in a way somewhat different from

ours, and that filling also was not water-tight. We continued our experiments with various amalgams. The first we tried was Fletcher's platinum and gold amalgam. On the whole, the experiments made with Fletcher's expanding amalgam showed that water-tight fillings were produced by it. In the few experiments with the specific-gravity test, made to see whether there was contraction or not, I found that there was a uniform contraction—a contraction less than that of most amalgams, but a contraction which seems to be tolerably constant; for I found that when I used about twice the bulk of amalgam the weight was about twice as much, and so with other quantities, the weight being proportional to the mass used. That would seem to show that the contraction was a real one, and not due to any error in the experiment. I did not, however, make a large number of experiments on the contraction of amalgams, because of the great amount of time which such experiments consume. With Sullivan's amalgam the experiments (which were all made by Mr. Ewbank) were rather inconsistent in their results. In one instance it failed pretty completely; in other instances it was tolerably water-tight, though not in so high degree as palladium or Fletcher's expanding amalgam. We then extended our experiments to gold filling. With soft foil, foil in the least cohesive condition, we did not make any large or difficult fillings, for the reason that it may be taken as an established fact that you can easily produce water-tight fillings with soft foil. In a number of composite fillings in which part of the cavity was filled with soft foil and part with cohesive foil, tolerably rapidly, that part which was lined with soft foil was absolutely water-tight, while that lined with cohesive foil was very much the reverse. After the first experiment I noticed carefully what the outline of the foil in the cavity was when I began to use it cohesively, and therefore I was able, in looking at the stained cavity afterwards, to make out what the staining corresponded to, and I found that it corresponded exactly as stated in the paper, with the highly cohesive foil which I had used with considerable rapidity. Then going on with cohesive foil, we found that by using

the foil in the most highly cohesive condition, highly annealed immediately before using it, we could obtain absolute and uniform success, but only in one way, and that was by using it in very small pieces, with a very great expenditure of time and labour; so that in filling a cavity involving say half a bicuspid, and running up on to the grinding surface, something like three hours would be expended in packing the gold. These experiments were mainly made by Mr. Ewbank, and I must add, the successes mostly came from his hands and the failures from mine. In order that I might not have to say that all my experiments were failures, I tried one cavity in the same manner, using small pieces of gold slowly, and I obtained a perfect result. We have only one failure to record in using gold in very small pieces, highly cohesive, and with a great expenditure of time. When we used the gold rapidly we had uniform failure. There seemed, as far as our experiments went, to be only one way of inserting highly cohesive gold, and that was by using very small pieces very slowly indeed. I succeeded in making one cohesive filling rapidly, but it was in a small round cavity, and with a rose head, such as was recommended by Mr. Fletcher, which nearly fitted the cavity—it was a very easy cavity, and not comparable to any of those in which we made our other fillings. One or two experiments were made with sponge gold, used slowly, and with some success and some failure. No doubt the failure was due to rather too rapid operating. Since making the experiments I have met with a paper by Dr. Bogue, read before the New York Odontological Society, in which he records a number of experiments on the contraction of various amalgams, and also on their making water-tight or non-water-tight fillings. Of all the amalgams experimented upon, he has found quite a large number to contract, excepting palladium and precipitated silver. He measured the contraction by taking a little cylindrical bar of amalgam, and by a sort of micrometer arrangement wrote it down numerically, so that he was able to compare the relative amount of contraction of a number of different amalgams. He thus sums up the result of his experiments:—"We notice, in the first place, that there is but

little variation in the shrinkage of those that shrink, the largest amount being $8\frac{1}{2}°$,—about $\frac{1}{424}$th of an inch; and the smallest amount being 2°,—about $\frac{1}{1300}$th of an inch; provided our instruments are correctly made; while the two that expand permanently, expand, the one, palladium, 9°, and the other, pure silver, 20°. We have here a clue to the bulging out often apparent after the filling was finished, of the old amalgams made of coin filings. A noticeable thing in the experiments with the acids, was the apparently good margins of nearly all the fillings. To carry still further positive knowledge on that point, I dropped all these teeth, wet with saliva as they had been for months, into a solution of indigo, which was placed in the water-bath at 100°. After lying for two days in that blue fluid, I took them out, cut them open through the filling, and have attached to each a label showing which amalgam was used, and what action it had been subjected to. It will be seen that, if almost any amalgam is used intelligently, teeth can be filled so as not only to preserve them, but to do so without danger to the general health from any element of the filling, unless it be copper. Of that I am not sure."

Dr. Bogue has met with a higher measure of success than we did in getting water-tight fillings. The solution he used, however, is a different one. He has been in the habit of placing his fillings in a solution of indigo. I do not think he says exactly what solution of indigo. I have found no mention of it in his paper, and it is possible that it may be a solution that is not a solution at all, but a fluid coloured by an infinite number of very fine solid particles suspended in it. The solution with which all our experiments were made was Draper's ink, which is a true solution, I believe some solution of logwood. Dr. Leslie has placed in my hands an artificial pivot tooth, the cavity of which he filled with sponge gold, and placed in ink. It has been broken up this evening, and the result is a perfectly water-tight filling. The cavity is a small one, and perfectly cylindrical, so that it is a very favourable cavity for making a water-tight filling in a moderate length of time. Our experiments certainly should make us think a little before we make that use of the cohesive foil that most of

us use in our every-day practice. My own conclusion on the subject would be, that wherever it is possible we should have soft foil against the walls of the cavity, and not let cohesive foil touch the walls of the cavity. Of course, this is impossible in a considerable number of cavities; but, wherever it is possible, it seems to me that would be a good rule to follow, because it is difficult to make a failure with soft foil, and extremely difficult to make a success with highly cohesive foil.

Mr. FLETCHER.—I have been following up the same subject with regard to cohesive gold, and have made some large plugs in square cavities with two sides open. These plugs were made in many instances without retaining points. I have tried occasionally commencing with a loose, hard pellet of adhesive gold in the cavity, to prevent my getting a firm anchorage, and have found, in using burr-headed pluggers, in nineteen cases out of twenty I could get perfectly tight plugs with cohesive gold. In making such a statement I know that I am, as it were, eating my own words, having been the first to call attention to this point as regards cohesive gold, viz. the difficulty, and as I thought the impossibility, of using it successfully; but I find that with burr-headed pluggers I can use it successfully in every case, and that I can use cohesive gold as quickly as soft foil, and as safely; but it requires peculiar management, and a little theoretical experimenting with the variety selected for use, to obtain success at first. With regard to plastic fillings for the production of tight plugs, it appears to me that expansion or shrinkage has little to do with the matter. I question if it has anything at all to do with it, unless the alternation be very great. If you analyze Dr. Bogue's results, you will find that the two amalgams which gave respectively the least and the greatest shrinkage, namely, my own and Johnston's, both gave perfect moisture-tight plugs, whereas several which gave intermediate points of shrinkage failed. In that he practically agrees with my own results, that the production of moisture-tight plugs with plastic fillings depends more on the nature of the filling itself, and the way in which it is used, than on the

question of shrinkage or expansion. You may make perfectly sound plugs, and perfectly tight plugs, with the amalgams much shrunk. I would take three out of the four amalgams which Dr. Bogue has experimented on, and I will undertake to make large moisture-tight plugs with those amalgams, knowing that they shrink, by simple management, learning their habits, and knowing how to treat them. Some time ago, an alloy was recommended to the Society because it had a trace of expansion. Now it so happened that that alloy had the peculiar trick of not working in a damp cavity; that is, it lost its shape in the presence of moisture. That same alloy, if you kept it perfectly dry, made perfectly moisture-tight plugs; but if you allowed the moisture of the mouth to come in contact with the plug, or if the cavity was in the slightest degree damp, the plug was generally a failure. It was possible in that case to get either good or bad results with an alloy which had an expansion, by management and treatment. Again, if we take an alloy which has a distinct shrinkage, and make it into small pellets or discs, and work these on to the surface of the cavity, so as to get perfect contact, the amalgam must have a very great shrinkage indeed if the plug is not a perfect one. The difficulty is to get perfect contact. If the cavity is at all damp, the amalgam will not adhere to it; and I think the same remark may apply very well to Hill's stoppings, and gutta-percha stoppings of that class. I have brought a few plugs with me, which are odd ones, selected out of some hundreds made during the last three months with relation to these questions. These plugs vary in size; they were made not for the purpose of exhibition, but for my own experiments. In these plugs, all made by myself, I think I show plainly that for an amalgam to be a success or a failure depends more on the operator and his knowledge of the material he uses, rather than on the properties of the amalgam itself—that it is possible to make good work with bad materials. I will lay the plugs on table for examination. I have here three plugs made with my own platinum amalgam, of which Dr. Bogue gives the shrinkage as 1 in 1,800 by linear measurement. The shrinkage I show here by packing in a tube an inch long, and is visible

from the alteration of the metallic face. Now, that same alloy packed in a tube filled with water and immediately covered with ink, or packed in a dry cavity, makes moisture-tight plugs with Draper's ink, which is perhaps the most severe colour-test that can be used. I have here another alloy which has a distinct expansion. I packed it in the same way in a tube an inch long, and it has burst the tube, has cracked it the whole length, and split the end. To prevent errors, the other plugs of this alloy were made of filings that were cut off the ingot at the same time, and all mixed together. The same alloy packed in a perfectly dry cavity and immediately covered with ink nearly floated out of the cavity, but if packed in a dry tube and kept dry on the surface for twenty-four hours, it makes a moisture-tight plug. An addition of 6 per cent. of platinum to this alloy gives it the power of packing under water. I took the ingot which I had used and which had failed in a dry cavity, and added 6 per cent. of platinum to it, and made it a perfect success. I have frequently referred to ingot variation, but these plugs were taken from ingots which were picked out of a number as the best. There is always some variation.

I have here a plug of precipitated silver, one packed in a cavity filled with Draper's ink, which is a perfectly moisture-tight plug; there is no trace of discoloration down the side of the cavity. A plug of this kind, however, is difficult to get. I have made ten or twelve, and this is the only one left. All the others have burst and blown the glass to pieces. The expansion of precipitated silver is so great that, unless very strong tubes are used, it is almost impossible to keep them. It expands for a long time after it is perfectly hard, frequently for a fortnight or more. With regard to the packing of a bad amalgam so as to get good results, I have here a plug which was packed with an amalgam which shows almost the greatest shrinkage of any of those mentioned by Dr. Bogue; and I think I would undertake to make a similar plug almost of any amalgam that he refers to. As regards perfection this plug is perhaps a curiosity; it is absolutely faultless in every way. Perhaps Mr. Tomes will criticise it. The shrinkage of the amalgam of which I have made this plug Dr. Bogue states

to be about five times the shrinkage of the platinum alloy referred to. The plug was made by a trick which is not practicable in all cases, but it is so in most. I got the amalgam very dry, and mixed it with my hand into a ball; I then put the powdery mass into a small ivory mortar having a hole through it; I broke a little bit of the mass with the plunger, squeezed it down to the bottom of the mortar, and then pushed it out at the bottom, and in this way made the whole of the amalgam into little thin discs. I took those discs singly and packed and worked them on the surface: when they get into contact with the surface, it matters little whether the amalgam has contraction or not; it will make good plugs. The use of the mortar is of course a convenience, not a necessity. I have gummed a few of the discs used on to a card, so that the members can see them. The plugs that I have here have been picked out of a great number, and but for the short notice I would have got up a series of plugs from ingots, with a note of the proportion of metals contained in each. I may say, in conclusion, that I believe the question of plastic fillings is really more a question of the common sense of the operator and the tact which he uses in managing the material, than a question of the material itself, with the one exception of discoloration, which I think invariably occurs to a much greater extent where an excess of mercury is used. It seems that discoloration is in proportion to the percentage of mercury. The same alloy in the same mouth will discolour greatly or not at all, according to whether it is used very dry or with a great excess of mercury.

Mr. Charles Tomes.—The antagonism between the experiments of Mr. Fletcher, and those which I have related, is more apparent than real. Mr. Ewbank and myself have attempted to see what could practically be done with difficult cavities, such as were met with in the mouth; in no instance have we taken anything so favourable as a cylindrical cavity, except for one of the very small adhesive gold fillings. I agree with Mr. Fletcher that it is possible to make watertight fillings with amalgam that shrinks a good deal, supposing

that it could be so manipulated that the direction of the shrinkage should be such as not to pull it away from the walls of the cavity. We have not had many successes to record except with palladium, and with Fletcher's expanding amalgam. Mr. Fletcher, I believe, puts less value upon his expanding, than upon his platinum and gold amalgam.

Mr. Fletcher.—With regard to the amalgam which I referred to, the shrinkage of which is considerable, the surface of the plug becomes hollow, saucer-shaped, yet it remains in perfect contact with the walls. But that amalgam has one peculiar property, that it will not work successfully in the presence of moisture; it loses its shape, like many other amalgams. The great difficulty with many amalgams is that, as a rule, they will not work and give good results in a cavity which is slightly damp: the cavity requires to be perfectly dry and the amalgam requires to be kept dry also. I believe the failure of nineteen fillings out of twenty is entirely owing to the presence of moisture, and I have only been able to reproduce the peculiar failures which I have not been able to account for in the mouth, by packing in wet cavities. By this means I can perfectly copy all the peculiar appearances of amalgams which I know in the mouth, and which fail in a certain way in practical use. Whether they expand or contract, they fail in many cases, and that failure can only be copied by packing under water. Several plugs in the case have been packed under water to show the failure, such as was found in the mouth with the same alloys.

Mr. Sewill.—I should like to ask Mr. Fletcher one question —what method he takes to dry the cavities?

Mr. Fletcher —The best way I have yet found of drying a cavity is to use a solution of gum copal in ether, to which a small quantity of collodion has been added. That solution, if used very thin, leaves no thick coat of varnish in the cavity, and it has the peculiar property of adhering to a wet surface. If you take, for instance, a piece of ivory which has been

soaked several days in water, and without drying it pass a small ball of wool over the surface, the wool having been soaked in the ether solution, you will find a track left by the wool from which the water has been driven, and which is perfectly dry; there is no visible varnish on the surface; the solution is much too thin; it merely fills up the pores and makes a surface, which is practically greasy and will not take water readily. Many resin varnishes have the same property, but this has the advantage of drying very rapidly.

Dr. Leslie.—I have been very much interested in the record of experiments read and the remarks made this evening, especially with reference to amalgams. This subject is an old one with me, as I have in my library a book which I received from Dr. John Evans, of Kentucky, nearly forty years ago, containing an account of the discovery of an amalgam. During the year 1838 a person from England introduced in Cincinnati an amalgam termed the "Royal Succedaneum," a term with which I have no doubt some of the older members of the profession are familiar. He came to make money, did his work cheap, and the result was he filled a number of cavities. In most cases he did no excavating, as he announced "painless operations." He capped nerves and filled with the same material, remained but a short time, and left quite a harvest for dentists to extract the teeth or dig out the material. In my effort to analyze the materials used, and combine others, I produced an amalgam composed of materials which form the best combination and produce the best results, as proved by the latest experiments in America, and almost exhaustless experiments of Mr. Fletcher here; but its use was so generally condemned by the leading members of the profession then, that to mention it as having any merit was almost to lose caste. Such was the case for almost twenty years, or until Dr. Townsend, of Philadelphia, and Dr. William M. Hunter, of Cincinnati, two of the most eminent practitioners we ever had, determined from their experience that an amalgam, even with the dreaded mercury, could be made and applied free from deleterious effects. Then we had "Hunter's Argentine," and

"Townsend's Amalgam." Its use has increased ever since, and in many cases is superior to anything else. The chemical affinity of mercury for a mass of metallic crystals is a wonderful demonstration of that unseen power that holds atoms together. To effect this it must be, as some workmen technically express it, "wet," or moist we say. The crystals of the metal require their definite proportions of a power contained in the mercury. The mercury does not dissolve a single crystal, and, speaking chemically, we have no chemical action, as we have no solution—but simply a mixture. The mercury may be in excess, and when the superfluous mercury is pressed thoroughly out, and the mass is "wet" or moist, the air is expelled. This wetness passes off or is absorbed, leaving a dry hard mass; but the remarkable fact occurs that the weight of the dry mass is the same as when it was wet. I have tested this repeatedly, and my plugs practically weigh the same dry as wet.

The experiments with gold foils are very instructive. The reason why a filling made with non-cohesive foil is moisture-tight and another made with cohesive foil is not, has been often asked. My opinion is that cohesive gold annealed just when operating has that property of cohesion in its highest degree of activity, and when the pellet receives the pressure in condensing it becomes solid throughout, and if the pellet is large, its thickness prevents its close adaptation to the walls of the cavity. The non-cohesive (or gold unannealed) not cohering or forming as solid a mass so readily, has a degree of yielding adaptability, remaining longer under the power of the operator before it becomes thoroughly condensed than a pellet of cohesive gold foil. It might be interesting to some of you to make the following experiment, and I think the result will prove my theory correct. Get a book of cohesive foil; take a leaf out, turn it over on itself, and you will find no cohesion whatever, although it is called cohesive gold foil, even after you have pressed the leaf where it comes in contact with the finger. It is really non-cohesive in its present condition. Fill a part of or the whole of a cavity with it; now take a leaf out of the same book, anneal as usual, fill a part of the same, or whole of a

cavity, then test as usual with Draper's ink, which Mr. C. S. Tomes considers a severe test. If the ink penetrates around the cohesive filling and is absent in the non-cohesive, it is fair to conclude my theory is correct. There are many operators who are quite satisfied that they can make a moisture-tight filling with cohesive foil, and they are willing to spend the time and labour, believing that the density is greater and wears better on grinding surfaces than non-cohesive foil.

In reference to the hole of a pivot tooth that I filled with my crystalline gold, and placed in the hands of Mr. C. S. Tomes for testing, I am pleased to know that it passed through the ordeal safely, and has come out moisture-tight.

Mr. Tomes.—Dr. Leslie brought to the notice of the Society several meetings since a peculiar form of sponge, or crystalline gold. I recollect Mr. Makins twenty-five years ago produced a form of gold very similar to that which Dr. Leslie exhibited. The last time I met Mr. Makins, I suggested to him that as at this meeting the question of the behaviour of materials for filling teeth would be discussed, if he had any specimens by him it would be well to exhibit them. Mr. Makins, I believe, has the specimens I have alluded to with others, and they can be examined after the meeting. But I will leave him to speak for himself.

Mr. Makins.—I have brought a small case of specimens, which I may call typical specimens, of reduced gold; beginning with probably the earliest, which was a form of sponge gold, the desirability of some form of which my friend Mr. Tomes suggested to me some twenty-five years ago. I produced at that time a considerable quantity; it was largely used for some time, but my own avocations prevented me going on with the making of it. Other forms afterwards arose. The conditions on which we get gold precipitated are very curious and interesting, and it is difficult not to get it crystalline. No matter how you throw it down, you almost always find crystals in it to a greater or less extent; but in the special form which Mr. Tomes speaks of they are largely and universally present;

in fact, the whole surface is covered with these crystals. I have also brought for your examination some microscopic specimens, some of which were mounted from gold made at the early date I have named; and some, at the time the larger specimens were produced; the latter I made for the Queensland department in the International Exhibition in 1872, at the special request of the Commissioners.

The specimens shown were as follows:—

Pulverulent Gold as reduced by the lower metals, as zinc.
Two specimens of ferrous sulphate reduction.
One, by sulphurous acid.
Three, of various forms produced by oxalic acid.
One, as thrown down by some simple bodies, and in this case by carbon (charcoal being used).
Two, by electrolysis, one of these deposited from auric cyanide, and the other from sodio-chloride.

Mr. Coleman.—We cannot, I think, too highly value the paper we have heard this evening, for it is only by such experiments as those recorded, that we can hope to get correct ideas upon the best materials for amalgams, and the proper way of employing them. With regard to the latter, the observations made by Mr. Fletcher are of considerable importance, and it will be a great advance if we can select one compound for a dry cavity, and another where it may be, though now very rarely, impossible to maintain it perfectly dry. One important point, however—and Mr. C. Tomes has alluded to it—is this, is it absolutely necessary for the permanence of a filling, that it should be absolutely water-tight, or at least "test-tight"? Hill's gutta-percha compound will preserve a tooth from extension of caries for many years, and when it fails, does so more from attrition than from anything else, and yet it has been shown how almost impossible it is to render a tooth filled out of the mouth perfectly "test-tight" with it. It is true its elasticity may perhaps to some extent compensate for its deficiency in the former respect. I regret now that when I had several opportunities of examining teeth filled many years ago with gold by the elder Mr. Cartwright, I was not aware of the ink-

test mode, as the results of such trials would have been very conclusive.

Mr. Fletcher.—In reference to the use of different compounds for wet or dry cavities, I wish to repeat that the expanding amalgam works badly in wet cavities; it is more difficult in practice to use, and in the hands of a moderately careless operator does not give such good results. Platinum amalgam is a safer material in the hands of a careless man, and where it can be plugged it is safer in every cavity. With regard to experimenting in cylindrical cavities, the plugs that I have shown are not such as I should have brought if I had had sufficient notice. I would have made moisture-tight and perfect plugs of any shape and in any position, even on a flat surface of ivory, which should be wet in the first instance. I have done it scores of times; indeed, I made one specimen on a piece of mother-of-pearl shell, which was sent to Mr. Oakley Coles, and which, when separated, showed the prismatic colours of the shell on the metal, proving how absolutely perfect the contact had been.

Mr. Charles Tomes.—I do not know that I have much to add. We prefaced our report with the statement that our experiments, made in leisure moments, must only be taken to represent the kind of results that we may expect to get by operating in the mouth. They were made, many of them, with very great care; expecting to succeed in the first instance, failing the first time, trying again with greater care under conditions perfectly similar; and some of them were made with the utmost possible care, under, I believe, every possible favourable condition. We tried amalgams in every condition of dryness; we tried them so dry that they looked like black powder, and when the cavity was filled, it rang as much as amalgam that had been put in for a week, when tapped by an instrument. The results that we came to on the whole were unsatisfactory, that is, I do not see my way towards making water-tight filling in the mouth with most amalgams. Whether water-tight fillings are absolutely essential is another matter, into

which I will not now enter. I will not sit down without saying I believe that the remarks which our communication has elicited from Mr. Fletcher are perhaps of more value than what we have ourselves contributed.

The CHAIRMAN.—In the name of the Society, I beg to thank Mr. Tomes and Mr. Ewbank for their interesting communication. There is no subject more interesting than amalgam stoppings. With regard to gold, it is immaterial whether you have soft gold or adhesive, or sponge or crystalline gold ; the success in ninety-nine cases out of a hundred depends upon the manipulator. But in amalgams you are at the mercy of the material you use. Though Mr. Fletcher has stated that you may make water-tight amalgams with material that shrinks, he admitted that it depends upon manipulation and trick ; but I think in most cases you are at the mercy of the amalgam. The manipulation of course assists much, but not as in the case of gold. We are also obliged to the other members who have contributed their specimens, including that interesting but very explosive apparatus exhibited by Mr. Coleman. I am afraid that on some dark day, if you bring a light near it, the tooth may come out without the use of forceps.

The meeting was then adjourned to Monday, May 3rd.

GENERAL MONTHLY MEETING.

Monday, May 3rd, 1875.

JOHN TOMES, Esq., F.R.S., President, in the Chair.

The Minutes of the last Meeting having been read and confirmed,

The following gentleman was elected as a resident member :—

Frank Ebbetts, Esq., 30, Margaret Street, Cavendish Square.

The following gentlemen were proposed as resident members :—

John Alexander Eartley, Esq., 5, Sackville Street, W.
John H. Hatfield, Esq., L.D.S., 25, Old Burlington Street, W.

And as non-resident members :—

David Amos Wormald, Esq., Bank Street, Bury.
Maurice D. Woods, Esq., White Hall Place, Stockton-on-Tees.

The following donations to the Library were announced :—

A copy of the Hunterian Oration, 1875, by the Author, Fred. Le Gros Clark, F.R.S.
A copy of the "Transactions of the New York Odontological Society," from the Society.

The President.—It is my painful duty, to-night, to announce to you the death of my predecessor in this chair. There are few amongst us who were not personally acquainted with Mr. Ser-

combe, and I think those who were personally acquainted with him will all agree with me that he was a man of great value in our profession, that he was a man of upright bearing, and of strong feelings, and with so strong a love for truth that on no occasion did he fail to denounce that which he thought to be untrue, or to uphold that which he thought to be right and just. He was especially valuable I think in this time of educational activity in our profession, on account of the very high standard he set apart for himself as regards professional duties. He recognized fully the professional truth that not only competence but excellence is an absolute duty on the part of a professional man; that nothing excuses any shortcoming in the full and faithful discharge of those duties which are intrusted to him by his patients. I feel that I cannot do justice to a character such as that of Edwin Sercombe; that I am in no way able to express my full appreciation of his excellence. It would not be right that I should from this chair, even in the acknowledgment of virtue, disregard the claims of personal privacy. But I may so far advance into the domain of his private life as to tell you that in the conduct of private practice the thought of personal gain in the management of a case was always secondary to a strong desire for its successful treatment, and that in many cases personal gain was from the first generously, perhaps too generously, abandoned. An energy which allowed of no rest ever hurried him forward, alike through the long hours of business and in times of recreation, at a pace which was destructive to a constitution naturally far from strong—to promise was to perform, and he undertook more than his physical powers could bear. He has fallen at his post in mid life, at a time when his life was most precious to all around him, and at a stage of our professional history when the loss of such a man from amongst us is indeed a very great loss. His example was of the highest order, and the encouragement he gave to the younger members of the profession of the greatest value. He might at times, perhaps, be said to be outspoken; but if it were so, the advocacy was always on the right side, as he believed—and we are all sometimes liable to error—it was always in the cause of truth and of justice. I would say more; but I am unable to do so;

I will ask a member—may I name Mr. Saunders—he has of late been closely associated with Mr. Sercombe—to propose that a letter of sympathy and condolence be addressed from this Society to the widow ; for in doing so we shall be doing a simple act of justice to the memory of one whose disinterested labours in our behalf have laid us under many and deep obligations. For ourselves the greatest and best testimonial we can raise to him will be to follow his example in maintaining for ourselves the same high standard of professional excellence and of conduct, which most certainly was his guide through life. I feel, gentlemen—and I hope you will feel with me—that in the death of Edwin Sercombe the profession has lost one of its brightest ornaments, the Society one of its strongest supports, and many of us one of our warmest friends.

Mr. Saunders.—I hope, Sir, I shall not be accused of presumption in undertaking this very delicate duty after the eloquent eulogium to which we have just listened, which was not only eloquently expressed, but deservedly applied to our lost friend. I feel that it is a very arduous task to undertake to convey to those who are immediately concerned, the sympathy and condolence of this Society. But as you have been kind enough to call upon me to do so, I shall not shrink from undertaking the task, however inadequately I may perform it. I will move that a copy of the following letter of condolence be forthwith transmitted by the Honorary Secretary to Mrs. Sercombe on the sudden and unexpected loss of her husband, the late President of this Society.

" The President and Council and Members of the Odontological Society of Great Britain desire to avail themselves of the earliest opportunity to express to Mrs. Sercombe their deep and heartfelt sympathy with her in her recent heavy and unlooked for bereavement. They trust that she may at least derive consolation, if it be too much to hope that it will materially mitigate the poignancy of her grief to have the assurance of the high estimation in which her lamented husband was held by his confrères, and that his memory will long be cherished as of one

who practised his profession, not only with advantage to the public, by whom he was largely appreciated, but with honour to himself and to the profession to which he belonged. The energetic and courteous manner in which he discharged the duties of President of the Society, during the period of its migration to its new home—the most momentous in many respects since its establishment, and the admirable Address delivered on that occasion, had already elicited the approbation of its members, and will long be had in remembrance as constituting a new claim on their esteem.

"Signed on behalf of the Council and of the Society, in pursuance of a resolution passed at the Meeting of May 3rd, 1875.

"JOHN TOMES, F.R.S., President."

I of course do not wish to bind the Society to the terms of this letter; I submit it with all its errors to be altered and amended as the Society shall think proper.

Mr. JAMES PARKINSON.—As an old friend of Mr. Sercombe's, it is a great gratification to me to hear him so kindly and honestly spoken of. There is no man in the profession I ever met, whose heart and soul were more in it, and who endeavoured on all occasions to elevate and improve its professional and social position. In private life he was all that could be desired,—a true, honest, and sincere friend. Impulsive and energetic in his nature, he might sometimes appear "brusque," if I may use the expression; but I am sure no man in this Society had less intention of offending, or who more regretted it if offence could be taken, than our late lamented President. In his domestic circle he was to my knowledge a good and affectionate husband, and to his children a most devoted father. I beg to second Mr. Saunders's motion.

The motion being then put from the chair was carried unanimously.

The PRESIDENT said he had received letters from Messrs. Woodhouse and Vasey, expressing their regret that they were unavoidably compelled to be absent on this occasion. He then

called upon Mr. Elliott for the first casual communication upon "A Case of Union of Two Molars by Exostosis."

Mr. Elliott said, I have to present for exhibition a tooth —or I ought to say portions of two teeth—which have some peculiarities, sufficiently uncommon to make them an object of interest.

When the lady to whom they belonged consulted me, she complained of uneasiness rather than of pain. She had a swollen face, and on examining her mouth, I found the anterior molar in the left upper jaw decayed, and somewhat loose, and behind it the stump of a decayed second molar, deeply embedded in the gum, which was inflamed, and very much swollen. I decided upon removing them, and did so rather more expeditiously than I had anticipated; for, on extracting the tooth, to my great surprise the adjoining stump came away with it. There was nothing peculiar in the condition of the mouth—there was no disease of the antrum, and in a week's time the swelling had subsided, and the gum was healing, as after an ordinary operation. On examining the teeth, I found the fangs anchylosed by hypertrophy of the crusta petrosa, in such a way as fully to account for the somewhat unusual result of the operation of extraction. They were so firmly united that I am quite sure the crown would have broken off, rather than that the connection between the fangs would have given way. As this lady, until within a few days of consulting me, had never experienced even uneasiness from the presence of these teeth in her mouth, I concluded that the alteration in structure, the absorption of the alveolus, and the hypertrophy of the cementum, were due to long-continued subacute irritation, no doubt brought on by the presence of the stump of the decayed tooth.

The PRESIDENT remarked upon the extremely interesting character of the specimens which Mr. Elliott had exhibited and described, exemplifying as it did one of those interesting questions which arise as to the period in which union takes place, and its cause.

Dr. THAYER, of Montreal, then exhibited specimens of what he called a new Dental Base ; but in the absence of any definite information repecting it,

The PRESIDENT, supported by Messrs. Coleman and Cattlin, objected to its being discussed before the Society.

The PRESIDENT then called upon Dr. Walker for his communication on cases of Ptyalism, from the use of coloured rubber.

Dr. WALKER.—Mr. President, perhaps you will first permit me to exhibit a model, which may be of some interest to the Society, and to give you a short history before I proceed with the other cases. The patient was 75 years old. Two years ago she erupted a left wisdom tooth, which gave continued pain, and produced sleeplessness ; after enduring the pain for six weeks, the points of the cusps became erupted. The tooth was extracted, and a cure effected. She presented herself again with a right wisdom tooth, which was just cutting through the gum. I know that cases of this kind have been recorded in our Transactions, but I do not think that there are more than about two where the patients were 75 years of age, and both the wisdom teeth were erupted. With regard to the other matter, I regret very much I was not here when Dr. Bathurst Woodman introduced his subject of vulcanized rubber affecting the tissue of the mouth. I was here last month, when I intended to give you the history of three cases which came under my notice, during the space of eighteen years. I cannot go so far as Dr. Bathurst Woodman did, in saying that red vulcanite affects the tissue to any such extent as he thinks, but on referring to my note-book, I find that eighteen years ago I attended a patient about 56 years of age, the wife of a

tradesman, and rather full in habit. I carefully prepared an upper suction vulcanite case ; after it was fitted, she returned to me in about six weeks with intense dryness of the mouth, and a slight ulceration of the edge of either side of the tongue. I induced her to wear it, and gave her a tannic acid wash with other treatment ; but she returned continually, and said that if she left the plate out of her mouth for three or four days all the symptoms subsided, but after it was replaced, in three or four weeks the symptoms again returned. I tried another specimen of rubber with like result ; I then carefully prepared a gold case, which she wore for ten or twelve years with great comfort. I think several years passed before a similar case came under my notice. Of the other two cases, one occurred twelve years since. With a side-piece of five teeth, the epithelium of the mucous membrane was entirely denuded, and the patient suffered a great deal of pain, irritation, and swelling around the necks of the teeth embraced by the frame. I advised him to discontinue its use, except for mastication. The symptoms subsided, but did not entirely disappear. Again I made him a gold case, which he wore with very great comfort, and which he is wearing still. The other case was that of a woman 68 years of age ; I made her a case of three upper central teeth, one bicuspid, and two molars on either side in vulcanite ; continual ulceration of the tongue, not only on its sides, but on its entire surface, followed ; but when a gold case was made and worn, there was no ulceration whatever. I leave these facts for the consideration of the Society. I do not think I attach undue importance to them ; but these four cases made me discontinue the use of red vulcanite for 6½ years, using black rubber instead ; and since its use I have not seen a case presenting the symptoms described. I find no difficulty whatever with any patient, when I have told them the rubber is pure in its black state, and that the red or pink rubber has some chemical colouring.

Mr. CATTLIN.—May I ask Dr. Walker whether he took any means of analyzing the vulcanite which was supposed to produce ulceration, in order to ascertain whether it contained arsenic or mercury in sufficient quantity to cause local irritation ?

Dr. Walker.—Yes, I gave the rubber into the hands of a very scientific chemist, the assistant of Dr. Percy, of Jermyn-street, thinking perhaps that, especially in the case of ulceration of the tongue, the ulceration might be due to arsenic. He tested it very carefully, but could find no trace. I suggested whether it was vermilion that produced these effects, and he looked back carefully and said he could find no record of vermilion producing these effects upon the mucous membrane; he also tried vermilion on the mucous membrane in several animals to see what the effect would be.

The President.—When Dr. Woodman read his paper, and recorded several cases, there were some doubts in our mind as to his ability really to collect all the facts in connection with the case, and we thought that there might be certain conditions of the mouth that would escape his observation, or that there might be certain defects in the pieces worn by the patients, or in the preparation of the rubber; but in the cases brought forward by Dr. Walker we can scarcely shield ourselves under these doubts. Knowing as we do Dr. Walker's familiarity with his profession, and with the use of dental rubber, we cannot think that a gentleman in his position would be driven to use the one kind of rubber unless he had a thorough belief in the cases he has related this evening. He has not told us, however, the condition of the remaining teeth that were in the mouths of the patients, how they lost their teeth in the first instance, or anything of that kind; but he has told us plainly what Dr. Woodman could not tell us, that the patients recovered and wore bone and gold and mineral teeth with impunity. I think the cases are worth careful consideration; and although they are rare, they are none the less important when they do occur.

Mr. Oakley Coles.—I fancy there is another interpretation that could be put upon the facts which Dr. Walker has brought forward this evening. In a certain number of instances we find patients have a scanty supply of saliva, and the introduction of a mechanical appliance for a time altogether arrests

that supply, and although you get perfect suction, still it would produce much more irritation than in a case of a patient where the supply of saliva is very copious. In those cases where I find irritation arising from the want of secretion of saliva in the mucous membrane I give the patient relief by painting over the surface of the plate and the mucous membrane with a solution of carbolic acid and glycerine. It stimulates the mucous membrane, and gets rid of the friction which is sometimes to be found on a dry surface. There is another reason why red rubber should irritate more than black; it is this, that the red rubber to some extent absorbs moisture, certainly more than the black rubber. The black rubber is denser in structure than most red rubbers. I fancied that the cases of Dr. Walker were brought forward as instances of Ptyalism, but so far as I understand Mr. Walker, they were rather cases of arrest of the secretions of the mouth.

Dr. Walker.—The responsibility of the word Ptyalism rests with the worthy Secretary of our Society. I simply called upon him and said I had one or two interesting cases which would perhaps bear upon Dr. Woodman's paper, but I do not think that I committed myself to the word Ptyalism when I saw him. With regard to Mr. Coles's remarks about the want of saliva, it was manifest in the case I noticed eighteen years ago, when I first saw it. The symptoms looked as if they had been caused by a very bad gold upper denture being alloyed with copper. I have frequently noticed a very impure gold plate producing what Mr. Coles speaks of—dryness of the mouth and arrest of the secretion of the saliva. I thought it was partly due to the mechanical appliance introduced into the mouth, and I made the patient persevere five months in wearing vulcanite dentures. Afterwards I made her a gold denture, which was very much heavier and extended over a greater surface than in the vulcanite. Therefore I cannot quite see the bearing of Mr. Coles's observation with regard to the swelling of the tongue being produced by a foreign body. The second case I quoted reminds me very much of a case I was called to see at Notting Hill. The man had been attended by

a surgeon who had prescribed blue pill. The surgeon had gone out of town, and the patient had continued taking the pills. Directly I entered the room I said, "There is mercury at work here." His tongue was very much swollen, and he could not get it into his mouth. In the second case, after continuing the wearing of the piece, the woman's tongue became so large that she really could not get it into her mouth. Therefore I cannot think it was simply the arrest of the secretion of the saliva that would produce so palpable a symptom as such an extensive swelling of the tongue ; and it was that case that made me discontinue the use of red rubber, and to substitute black for it. When a patient sixty-two years of age called upon me, having lost her upper teeth and the lower bicuspids and molars, I prepared a vulcanite upper denture and a lower gold bar, mounted with mineral molars in vulcanite base. After she had worn the denture six weeks she called to complain of swelling of the tongue and general tenderness of the gums : she could obtain no continuous sleep. When she discontinued wearing the teeth the symptoms subsided. Again, after using the teeth for a short time, she experienced similar symptoms as above described. I prepared a second and third denture, with different preparations of red rubber, but with a like result. After nine months' perseverance with the vulcanite sets, I prepared a gold denture and mineral teeth, which she wore with comfort, and no indication of swelling or tenderness of the mucous membrane.

Mr. Coles.—I think I should have said "mucous," rather than saliva.

Mr. Cattlin.—Before we can attribute all the bad consequences which have been attributed to the local irritation of vulcanite, we ought to know whether the patient has been subjected to the medical administration of mercury. I once prescribed a five-grain blue pill for a strong healthy man, to be followed by a black draught the next morning, and I shall not readily forget the sad effect of this small dose of mercury. Severe ptyalism was produced, and the patient's tongue protruded from his mouth for upwards of a week. Several cases

of this kind have been recorded, and they show how readily some patients are poisoned by small doses of mercury. This beink a well-known fact, it will be necessary for us, as members of a scientific Society, to know that Dr. Walker's patients had not been subjected to the medicinal action of mercury, before we can be certain that the ulceration he has described was produced by the local effect of that mineral. It sometimes happens that ulceration of the gums takes place when gold plates are worn for the first time. I remember a singular instance, in which the top of a patient's tongue became incurably inflamed, and experiments proved it to arise from galvanic action. It occurs to me at this moment, in which there was an incurable condition of the tip of the tongue. The tip of of the tongue of the lady became so exceedingly sensitive and sore, that I was puzzled as to what was the cause. At last I began to think that it was galvanic, and I determined to experiment upon the matter, and I ordered her to lay aside the wire pieces for a time. The tip of the tongue immediately got well; I then ordered her, without having any definite opinion about it, to resume the wearing of the set, and again the tip of the tongue became inflamed. I removed all these platinum tubes and pins, and put gold pins in their stead, and I happened to have by me then a number of the gold tubes, and made a set of that construction, and she no longer had any effect, such as was produced by the wire of the other set. I believe we often get, even with gold sets, galvanic effects, which in a particular individual case would not.

Silver wire had been used to fix gold-tubed teeth to a gold plate, and when gold wire was substituted, the inflammation at the tip of the tongue ceased.

Dr. Walker.—If you will allow me, I will refer to my notes and copy them out in full, and give them to you another evening, as I see time is passing on.

The President then called upon Mr. Turner to read a paper by Mr. Rose, of Liverpool, on "Hall's Suction-Valve."

Mr. Turner said, The subject brought before us by Mr. Rose is a matter of interest to us all, and I think it is moreover an exercise of great self-denial on the part of a provincial member to sit down and write a paper to be sent up to be read to the Society by a stranger, the author not having the pleasure of reading it himself or of hearing it discussed. I therefore received this paper with very great pleasure from Mr. Rose, and have much satisfaction in now bringing it before you to-night.

Remarks upon Hall's Suction-Valve. By J. E. Rose, Liverpool.

Mr. President and Gentlemen,

Having read with interest the report of a discussion at the January meeting of the Society on "the new suction-valve," introduced into England from America by Mr. Rutterford, I beg to offer a few remarks in furtherance of the object of that discussion—a due appreciation of the value of the new appliance; and, as I have had some successful experience with it, I venture to hope that my remarks may prove interesting and useful to those, at least, who have not yet adopted the invention.

That I may make the clearer my views regarding the new contrivance, it may not be out of place to say a few words about my past experience of the atmospheric pressure or suction principle, as applied to artificial dentures.

It is now nearly thirty years since I tried a good many experiments with various kinds of suction-chamber, both double and single, and with, as well as without, the addition of small gold spring valves; the result being a conviction in my mind that suction chambers were abso-

lutely useless, except in aid of *imperfectly* fitting plates. I became convinced that a well-fitting plate should be a sucker throughout its whole extent, and I have ever since acted on that conviction, by making all my suction-plates without chambers, and most of them without extension over the palate. I have met with some few of those patients, so aptly termed by Mr. Fox "wooden mouthed," who make one wish their mouths were literally of wood, so that the plates might be nailed or screwed to them; but with these exceptions, my success with suction-plates has been satisfactory.

These satisfactory results have, however, their drawbacks, the principal being an accelerated absorption of the alveolar ridge, rendering necessary an increase from time to time in the bulk of the artificial work. The absorption is not always equal; and it must be in the experience of many dentists to have been startled now and then by the appearance of cases, lost sight of for some years, in which absorption has been great and unequal, and the soft parts have been drawn, by the continual sucking action of the patient, under the plate and around its edges, in such a manner as to completely disfigure the form of the gum, and this without the patient being aware of anything wrong.

I have seen these effects in cases of my own,

and in those of other dentists, in cases with, and those without, suction-chambers.

As the new suction-valve is entirely self-acting, I think we may reasonably hope that among other advantages of its use, will be found a less rapid absorption of the alveolar ridge, and less risk of the unpleasant appearances I have mentioned.

I have now applied this valve in thirty cases. The first and second were old, imperfectly fitting plates for temporary use after extractions, the third a new one. In these three cases I adhered strictly to Mr. Hall's direction to make the chamber a degree shallower than the thickness of the rubber. As mere *suckers*, they were perfect. There was no danger of the plates falling out, but they rocked and hung slightly from the gum. I was not surprised at this, and hoped all would come right when there had been time for the rubber to indent itself in the mucous membrane.

In a few days I saw the patients—I speak of all three, as in all the results were similar—and found congestion of the mucous membrane under the rubber, with considerable pain in each case. I reduced the thickness of the rubber: the suckers still acted well, the plates held more closely to the gum, and the pain and congestion disappeared.

In the other twenty-seven cases in which I have applied the sucker to new and old plates, I have

had the chambers *exactly* the depth of the rubber's thickness and a trifle larger; the result being a total absence of the unpleasant effects at first produced in the earlier cases, and an equally firm attachment of the suckers.

In this way the suction of the whole plate is not interfered with, while the rubber valve is ready to keep the plate from falling, in the event of its being wrenched from its bearings in mastication, as will happen, particularly where the teeth are long and prominent, and the jaw small.

It may be worth mentioning, that instead of the loose platina pin, I solder one of soft gold into the large gold washer. This rivets more steadily, and makes a neater finish.

Regarding this invention as an auxiliary or safety sucker, I consider it an invaluable aid in surmounting the difficulties of unfavourable suction cases, whether those difficulties arise from the formation of the mouth, or the want of intelligent management on the part of the patient. By giving the wearer greater confidence in the support of the case, it will obviate the necessity for that constant sucking action, which, besides its prejudicial effect upon the alveolar ridge, is often very unsightly.

With this addition to our resources, I feel assured we shall be enabled to dispense with the use of spiral springs in a far greater number of cases than has hitherto been practicable. Flat

palates are, of course, the most suitable for the application of the sucker, but, with accurate work, I think it may be applied to palates of almost any form.

I cannot conclude these remarks without expressing myself greatly indebted to Mr. Hall for having made known his ingenious and efficient invention, which does him none the less credit from its being so simple as to make one feel almost ashamed of never having thought of applying, in the same way, a principle with which we have all been familiar since the days when, as children, we amused ourselves by lifting heavy stones with a disc of soaked leather at the end of a string.

Discussion.

Mr. Coles.—I am sorry to rise so often, but on the occasion of these rubber discs being brought forward I spoke very favourably of their success, and I think it is only right that I should tell of my failures. In one case that has been most marked, owing to the manner on which the rubber swelled. It was one of the first cases in which I used a disc; and when I saw the patient about a fortnight since the rubber disc had swollen up enormously; it was at least 1-8th of an inch beyond the chamber that had been cut for it in the plate; it had produced an excessively sore place in the palate, and caused great discomfort to the patient. The discs should in future, instead of being made of unvulcanized rubber, be made of vulcanized rubber, which would not be so likely to swell in the mouth.

Mr. Turner.—I should be glad if Mr. Coles would say how discs of vulcanized rubber are to be made and fitted. I have never found rubber last in the mouth unless it has been hard; even the velum rubber does not last at the outside more than two years, and I should like to see something better than that.

Mr. Coles said the discs could be made of the ordinary velum rubber, which, though vulcanized, was not hard, and in his experience lasted from three months to three or four years, according to the nature of the patients' saliva, and the care with which they kept their plates. Happily nothing lasts for an indefinite period, but the vulcanized rubber certainly did not swell, whereas the unvulcanized did.

The President then called upon Mr. Coleman for his paper.

On Matters pertaining to the Practice of Dental Surgery in Egypt. By Robert Waller, of Cairo, and Alfred Coleman, of London.

Mr. President and Gentlemen,

As the second of the names which appear at the title of this communication, I desire to inform those present that during a recent sojourn in Egypt for the benefit of my health I was anxious to avail myself of the opportunity of acquiring as much information as possible relative to the progress or otherwise dental surgery had made in that most ancient and interesting of countries, and in which Herodotus tells us that no doctor was permitted to practise any but his own peculiar branch, some only diseases of the eye, some complaints of the head, others those of the teeth, &c., &c.

My short stay in the country, coupled with my ignorance of the language, as well as my then delicate state of health, would have afforded me small opportunity for carrying into effect the object of my wishes had I not fortunately made the acquaintance of Mr. Robert Waller, of Cairo, whose long residence in the country, knowledge of the language, combined with a faculty for observation and comparison, rendered him for my purpose the very person to be desired; and as from

him I have derived my most reliable information, I must ask you, should it prove worthy of your acceptance, to accord to him the first credit, whilst I must ask you to hold me alone responsible for the manner in which that information is brought before you.

The first subject which engaged my attention was in regard to those human remains of antiquity commonly called mummies. From time to time it has been persistently stated that teeth filled with gold have been discovered in them, as also artificial dentures, and it is not remarkable that such statements should have been favourably received after the remarks which Herodotus has handed down to us.

With regard to the first, it appears that a considerable amount of attention has of late years been devoted in Egypt to this question. H. E. Marriote Bey, who, as collector and guardian of the objects of antiquity in the country under the Kedive, and who, as the head of the well-arranged and interesting museum at Boulak, must have had the opportunity of examining the skulls of some thousands of mummies, and who, it must be remembered, were of the "upper ten" of their own day, has never met with an instance in them of a tooth filled with gold or other material. H. E. Finney Bey, who, as his father before him, has done so much and successfully to raise our branch

of surgical art to a position both honoured and respected in Egypt, informed me that whilst he had bestowed much attention on the subject, he had never met with anything confirmatory of the statements which had been made; but admitted, and I trust I am committing no breach of confidence in repeating a statement made whilst I was the recipient of his hospitality, that he feared he was somewhat responsible for them, having made some observations in jest, which had been otherwise taken by those he was at the time addressing. Mr. Waller's opinion, founded upon long observation and inquiry, is the same as the foregoing authorities.

On the other hand, we find such an authority on Egyptian antiquity as Sir J. Gardner Wilkinson, stating, in allusion to the before-mentioned observations of Herodotus, "And it is a singular fact that their dentists adopted a method, not very long practised in Europe, of stopping teeth with gold, proofs of which have been obtained from some mummies of Thebes."* During my stay at Thebes of several days I made particular inquiry from those who had resided there many years, and they

* A popular Account of the Ancient Egyptians (revised and abridged from his larger work), by Sir J. Gardner Wilkinson, D.C.S., F.R.S.S., vol. ii. p. 350. I am indebted to Mr. C. S. Tomes for calling my attention to the above sentence. Mr. Tomes has, he informs me, communicated with that author upon the subject.

had never heard of any mummies' teeth containing gold or other material being found; but I was cautioned in making any inquiry amongst the Arabs not to describe too accurately the object of my research, as such would in the course of a few days most assuredly be discovered for me. It was a very common practice to gild portions of the face of those who were mummified. You may see some of it remaining on the eyelids of one of these two mummy heads—that from Thebes—kindly presented to our museum by Mr. Waller, though I fear the damp of this climate has now almost entirely destroyed it, as it has also sadly otherwise damaged the preparations. I saw it on the lips of others, and in one instance there was some attached to the teeth visible between the lips, and I think it not improbable, but that teeth so gilded have been found, and have been regarded by the uninitiated as filled with gold.

With regard to artificial dentures having been found in the mouths or cases of mummies, I could not find any person who had met with or heard of any such circumstance, nor could I discover from those who had had great opportunities for observation that gold plates, such as Mr. Mummery observes in his excellent paper it was customary to lay upon the tongue of the deceased, had been found; but I saw in one instance a portion of wood, oval, and about the size of our halfpenny

coin, and another of clay, both covered with gold which had been bandaged over the chin of the departed. Mr. Waller, however, informed me that he had seen a case where a loose tooth had been fastened to its neighbours by a gold wire.

Inquiry led to the conclusion that caries existed amongst the people whose remains have so long withstood the destructive hand of time, in small proportion certainly when compared with most of those who now occupy the same districts, but in what proportion my opportunities would not enable me to venture even at guessing at; for though I availed myself of every possible opportunity of looking at the mouths of mummies, it was only in a very small proportion the teeth could be rendered visible without more or less destroying the specimen. One of the mummies before you has, you will perceive, a supernumerary lateral tooth of the upper jaw.

With regard to the alveolar arches, in a few cases I should have pronounced them as ill-developed, with the teeth apparently crowded and irregular; but in these they were young subjects, and on closer observation it was apparent the skull had suffered from the tightness of the bandaging, the elasticity of which had, after the soft parts had disappeared, produced apparently a distortion in the maxillæ and some other bones. This portion of a skull was kindly procured for me at Sahara

by Mr. Russell, son of the talented correspondent of the *Times*. It probably dates from two to three thousand years back, and shows a well-developed superior maxillæ. At one time vast quantities of skulls might have been obtained at this spot, where they had been disentombed by the Arabs in their search for relics; but at the time I visited it, though fragments of mummies were abundant, I could not find any teeth or maxillæ.

For investigations of a much more recent date, an old burying-ground at Cairo, which was being demolished for building accommodation, afforded us an ample, though dusty, and perhaps not very safe opportunity, as our work was offensive to the prejudices of the Egyptians, as it was likewise to the tribes of wild dogs who make their abodes in these places. The burying-ground was large, occupying several acres almost in the centre of the city, and close to some of its oldest portions. The precise date of its existence we could not ascertain; some said, over a century; some said, less. It was reported to have been used during those fearful visitations of plague which at a former time were the scourge of Oriental cities, and, from the closeness the bodies were packed in some places, gave support to the foundation of such a rumour. I am inclined to believe the cemetery much older than reported, as on opening

the sere cloth in which the skeletons were enveloped* the bones were found dry and clean, quite free from adipocere, and had only in a few instances an unpleasant smell, and this even when the bodies had been very closely packed. Our conclusions, after examining a large number, led us to decide that the individuals there buried were, from the varieties of form presented in their skulls, not a pure race, but that in almost every instance their maxillæ were, as some preparations here exhibit, well developed, and quite free from those conditions met with at the present day, which cause a crowding of the teeth. In most cases the dental arches leaned outwards, indicative of a not highly civilized race, but affording increased space for the teeth contained in them. Caries was present in large proportion, though we considered less than would be found at the present day. It was evidently of the slow or hard variety, and had in most cases attacked a masticating surface. Alveolar abscess was present in a large

* Although the practice of burying without coffins is generally Oriental, yet amongst the Moslems it is a necessary rite, as immediately after burial it is supposed two angels of terrible aspect visit the departed, make the dead sit up, and question him respecting his faith. A coffin would, they feel, prevent such a procedure; but in most cases they overlook the fact that they omit to leave room in the grave for him to accomplish it.

proportion of the carious teeth.* Amongst the teeth which had been lost some had evidently been extracted, and, as far as we could judge, not by unskilful hands. In some instances the wearing down had been considerable, but upon the whole was less than I expected to find it in a country where sand and dust are so constantly finding their way into the mouth, as well as into the food, of all classes.

We now pass on to consider the dental condition of those who at the present time inhabit the country we call Egypt; and this really comprehends little more than the fertilized land forming the valley of the Nile from the first cataract to its outlets into the Mediterranean Sea. These are a very mixed race, for not only were the old inhabiters of the land, such as existed during the captivity of the Israelites, afterwards intermingled with their Greek and Roman conquerors; but in more recent times Egypt has received large accessories from the desert tribes, who have established themselves in most parts of the country. A mixed population probably suffers more from disease than a pure and unmixed one. It no doubt possesses in a larger degree the ten-

* This is commonly the case in old skulls, and to be accounted for from the circumstance that a deficiency of dental aid and skill at those periods led to dental diseases, running on through all their various stages.

dencies to disease of all who contribute to form it; and certainly as regards the diseases of teeth the modern Egyptians appear to suffer considerably. The tendency is alluded to by Lane in his "Modern Egyptians," who, after saying that their teeth are particularly beautiful, adds a note to the effect that toothache is a very common disorder, as it was in ancient times, probably, as Herodotus mentions dentists among the classes of Egyptian physicians. He observes, "It is, of course, most prevalent among the higher orders." With regard to the beauty of their teeth, I certainly saw many instances, particularly in Upper Egypt, amongst the Copts, who are a purer race, and more especially in Nubia, where, as to form, structure, and regularity, they would surpass probably any, one would meet with in a European town; but it must be borne in mind that amongst the less civilized races the teeth are always more prominent, and consequently more conspicuous, and show off much better on a dark ground than upon a light, such as the fair skin of the inhabitants of temperate regions offers. It was at one time, and probably may be still, the popular belief that chimney-sweeps possessed excellent teeth, but my experience amongst that class of persons would lead me to an opposite view of the case. I could not say that caries in the teeth, as I had opportunities for observing it in Egypt, possessed

any peculiarities, but it generally appeared to run a less rapid course, the disorganized portions of dentine being almost invariably of a dark colour, and at times quite black. That they suffer considerably when pain sets in I had many opportunities of verifying, and very frequently also, as is evident from the fact that during my trip up the Nile, although I was only regarded as a hakeem or doctor, I was more frequently applied to to relieve dental distresses than anything else, although at the time dysentery was common in the country, and owing to the excessive inundations of last year fever of various kinds very prevalent in the villages. The inquiries I made at the large towns we visited corroborated the same fact, and I learned, especially at Luxor, that diseases of the teeth were exceedingly common amongst the population. That caries has greatly increased of late years amongst the Egyptians is a fact vouched for upon the experience of Mr. Waller, and he is decidedly of the opinion that it is due to the habit of spirit-drinking having become of late much more common than formerly. The children of the Prophet are gradually, in this respect at least, forgetting their creed; it is an important observation, and if correct may throw some light upon its greater increase in our own country. Mr. Waller believes it interferes with the digestive functions, causing dyspepsia, un-

healthy condition of the mucous membrane of the mouth, with disordered oral secretions. The contrast between those who partake of alcoholic beverages and those who abstain from them, as seen in the latter case in the Beduins, is very remarkable; but other conditions of life between these two classes is very different.

Although caries exists to so large an extent in Egypt, periostial and alveolar mischief as a consequence of it is not nearly so common as it would be in this country or any equally moist climate; and I lay this stress upon a damp climate, feeling assured that it is more favourable for such conditions than a dry one. Several years ago I was much struck by a remark made to me by an intelligent practitioner, who had visited America, and there witnessed the dental operations of our Transatlantic brethren. After alluding to the then very common practice of destroying the pulps of teeth, he observed, "I am sure you can take far greater liberties with the teeth in that climate than you can in this." The truth of this observation has been repeatedly confirmed, to my mind, by patients who had had teeth filled in America, and which in that country were perfectly comfortable, upon coming to this soon suffered from alveolar abscesses, necessitating the removal of several teeth. In Egypt, where the climate is remarkably dry, not only is there this freedom from alveolar

trouble, but escharotics may be employed for the destruction of the dental pulp with much success. Mr. Waller says, "I find the use of arsenic in the destruction of the dental pulp of the greatest assistance to me. I employ it in large quantities, and take no special precautions in so doing; it often causes pain, but after there is no further trouble. The teeth so treated invariably do well." The limited size of Cairo enables him to learn much better how his cases have succeeded than would be the case in London or other large cities. He has also, in the successful replantation of three teeth, put to a still more severe test the powers of dental periosteum to resist irritation under great provocation in a dry climate. The latest was done three years ago in the person of a Greek; the other two were severally for a French and an Italian patient. The teeth replanted were molars. After removal they were placed in warm water and carbolic acid; after which their fangs were scraped free from all diseased periosteum; they were then filled with amalgam, returned to their alveoli, and retained until firm by floss silk.

Early loss of the teeth from alveolar absorption is very common amongst the modern Egyptians. I had considerable opportunity myself for witnessing this condition of things; at the age of forty-five, I rarely looked into a mouth in which some or more of the teeth had

not dropped out, and where others had their fangs partially exposed and were loose. To those practising dental surgery in Egypt, the supplying by artificial means these losses forms a very considerable portion of their occupation. That the increased tendency to indulge in alcoholic beverages, by disordering the digestive system, altering the oral secretions, and producing hyperæmia of the mucous membrane of the mouth, may account to some extent, as Mr. Waller believes, for this condition of things prevailing to a greater extent than formerly, I am prepared to allow, but am inclined to attribute it more directly to the softer food these people partake of in the present day than they did formerly. The process of rendering food softer by soaking or cooking has become much more common of late years than it was formerly. I am told that certain tribes in India who formerly ate rice and other grain, either uncooked or parched by fire, now eat it boiled soft, and that although they have remarkably fine teeth, they almost invariably drop out before reaching forty-five or at most fifty years of age. The diet of the poorer classes in Egypt is chiefly boiled peas, beans, lentils, flavoured with herbs and rendered palatable with a considerable quantity of salt, and, when it can be obtained, a little meat is added to the *bouillie*. The bread is made in flat roundish-

shaped cakes, it is usually leavened and of the whole meal of various grains, that of dura (darrah) and barley being the most common,—at least, in the villages and towns of Upper Egypt. It is coarsely ground in hand-mills, greatly resembling those employed by the ancient Egyptians, and not unpalatable. The value such an article of diet would mechanically present to the dental organs is lost by their invariably soaking it in potage or other concoctions to both flavour and soften it. In addition they are great consumers of green vegetables, as cucumbers, gourds, onions, leeks, chickpease, both cooked and uncooked, dates fresh and dried, maize picked nearly ripe and parched by fire; and amongst the very poorest the practice of chewing the sugar-cane is very common.

Besides a soft food, and a tendency to stimulation, we must not omit to consider the hygienic condition of this people, probably almost the worst that can anywhere be found to exist, at least in their villages. Small huts, consisting generally of one room about 10 feet square, made of unbaked brick or of mud, both collected from the river Nile and covered with the straw of maize, and mud, are the usual habitations of the poorer classes, and, in addition to the family, commonly accommodate one or more goats, or a donkey and a number of fowls. In the larger

towns the houses are somewhat better, two and three stories high; they are, however, almost devoid of comfort, means for cleanliness, and very insecurely built. It is no uncommon thing, even in Cairo, for a house to fall down, and in this respect I had myself a somewhat narrow escape. I had engaged to administer chloroform for a patient upon whom Dr. Grant, a physician of considerable experience in Cairo, was to perform ovariotomy. Upon arriving at Dr. Grant's house preparatory to our starting for that of the patient at Boolak, I was informed that the operation must be deferred, as the house in question had fallen down that morning and had killed three people.

It is, indeed, rare not to find a stinking pond or pool in the immediate vicinity of the smaller villages. The fuel they employ for cooking their food consists of the dung of animals collected by the children, dried in the sun, and mixed with straw, so that upon approaching a village it will not be difficult to imagine how the olfactory nerves of an inhabitant of such a city as ours may be assailed. With such absolute neglect of all sanitary conditions, heightened by want of anything like a proper amount of clothing, even for that country, can we wonder at the existence of a frightful mortality among its inhabitants? No correct censuses are taken, and so only

guesses can be formed as to the rate of mortality. Dr. Grant told me he believed that not more than one in forty arrived at full man or woman-hood amongst the class who live as I have described. The wonder is that any do live, and it is only to be explaimed when we consider the marvellous dryness of the climate, together with the abundance of scavengers in the dogs, vultures, and flies who exist in the land. Of the offal thrown out of the houses, that which is left by the dogs is devoured by the vultures, and that which is too small for the vultures suffices for the flies. The last-named plague seems to have resisted the rod of Moses, but their value I think—not generally recognized—is evident from the following circumstance. I had shot a large water-bird and broken his wing; upon securing him he covered me almost from head to foot with blood, and my dress being a light one, I regarded it as spoiled. I was soon covered with masses of flies, and in about two hours it was almost impossible to perceive where the blood had been. But from this digression, I must return to the point before us, viz.: the effect unhealthy conditions of life may have upon the dental organs, directly or indirectly, in consequence of impoverished condition of the blood and other secretions as well as the tissues in general. We know too well the effect of residence in large and unhealthy cities or

portions of cities here, not to understand what must be its consequences when those same conditions, aggravated to an extreme degree, exist. It will be pleasant to turn to a more agreeable aspect of the subject, and as contrasted with the inhabitants of the Nile valley or modern Egyptians, take that fine and truly interesting race the Beduin Arabs. Here we meet with probably one of the purest types of mankind, apart, perhaps, from some savage aborigines. These, the direct descendants of the Father of the Faithful by the bondwoman, are a finer race, but possessing some resemblance to the children of their half-brother. From his having inherited the wildness of his father Ishmael, and his hand having been against every man, and every man's hand against him, he has come but little into contact with the rest of mankind, and retained much if not most of his primitive nature. His habits and the character of his occupation also are all conducive to health. Living chiefly in the open air, in one of the most charming and invigorating climates the world can offer, rearing flocks of sheep and goats as well as horses and camels, moving from one place before the soil on which he has subsisted can be contaminated with impurities to another, the Beduin possesses all the conditions likely to produce a strong and healthy race. I think I have never seen so fine a race of

men. As to their teeth, they are remarkable for their strength and beauty. They do at times suffer from caries, though in a small proportion as compared with the Egyptians, but they do not appear to lose them in the same way by alveolar absorption; on the contrary, as I had reason to find out, the teeth are embraced by their alveoli with strong tenacity requiring more than human strength at times to effect a parting. Their diet is of a much harder and coarser description than that of the town Arabs, and their teeth consequently subject to a much greater amount of work, the knife and fork also being unknown amongst them, their teeth have still their original and intended office of separating portions of food for mastication, and the rapidity with which a large bone is divested of its fleshy and gristly surroundings shows how well their incisors and canines perform their functions, and how well in so doing they must be exercised. I have here a cast of the mouth of a Bedouin, from whom I extracted with great difficulty a lower molar. You observe what fine teeth they are, and that they are worn.* I will conclude my observations with a few remarks upon native dental surgery in Egypt. Extraction is the common remedy for toothache, and it is performed chiefly

* [The author of the paper then gave a graphic description of an Arab dinner, at some of which he had been present.]

by the barber, in upper Egypt at least, though it is also by the native surgeon, if he may be so called. A very rude kind of key is the instrument generally employed, though occasionally rough descriptions of forceps are called into use; formerly it was not uncommon to remove a tooth by placing against it a chisel, and then striking the latter with a hammer. On one or two occasions I endeavoured to get a view of the instruments employed, but was always put off by some excuse. Thus at Assouan, on the borders of Nubia, I thought I had so prevailed upon the barber, but when he found I did not desire to have a tooth extracted, he suddenly discovered that he had lent his instruments to the surgeon. Artificial teeth are constructed by the Arab dentists. Here is a rude upper bone-piece, showing the nature of their capabilities; we shall all admit there is some room for improvement. The Egyptians are still very superstitious, and rely much upon charms for the supposed cure of diseases; one of the gates in Cairo is covered with portions of hair, clothing, &c., of those who have suffered, whilst, into almost every crack and crevice carious teeth have been thrust, the idea prevailing that relief may be attained in this way.

Before sitting down I may say that I have

received the following letters from Mr. Joseph Bonomi:—

"The Camels, Wimbledon Park, S.W.

"*April 27th*, 1875.

"DEAR SIR,—I have been making some inquiries respecting the query in your note of the 24th inst., but as yet without any conclusion. The statement you mention does not appear in the first edition of Wilkinson's 'Ancient Egyptians,' neither can I confirm it of my own knowledge, nor can Dr. Birch or Mr. Flower, of the College of Surgeons, to whom I have applied. I will however write to Sir G. Wilkinson, and ask him for his authority. The idea may have originated in a passage in Morton's 'Crania Egyptiaca,' 1844, page 10, where it is stated that gold leaf had been found as a covering to decayed teeth in a mummy; and also page 25, that there is evidence of the extraction of teeth.

"I have a recollection of teeth formed of wood having been found in a mummy opened by the late Robert Hay.

"I am, dear sir, yours truly,

"JOSEPH BONOMI.

"ALFRED COLEMAN, Esq."

And this very afternoon the following has come to hand:—

"Sir John Soane's Museum, 13, Lincoln's Inn Fields,

"*May 3rd*, 1875.

"DEAR SIR,—Just received a letter from Sir G. Wilkinson stating that he saw gold in the tooth of a mummy—not gold leaf, but thin gold, in the house of Sig. Triantaphilos, a Greek, at Thebes.

"I will show you the letter when you do me the favour to come to the Soane Museum.

"Sir G. W. says the fact is published in his 'Popular Account, Ancient Egyptians,' vol. ii., p. 350.

"My dear sir, yours truly,

"JOSEPH BONOMI."

Discussion.

Mr. Mummery.—I feel that the Society is greatly indebted to Mr. Coleman for his graphic account of his general experiences in that land so far off; and more especially for having thoroughly worked out, as opportunity served, the question of the alleged presence of stoppings in ancient Egyptian teeth. I recollect having pressed Mr. Bonomi on the subject some years ago, when preparing the materials for a paper on the existence of dental caries among various ancient races,—to read before this Society.

Mr. Bonomi then assured me, that although he had lived among the tombs in Egypt for so many years, while pursuing his investigations, he had never met with an instance of a stopping in a tooth. Although he had examined thousands of skulls, when they were more easily procurable than they are at the present time, he never had the slightest reason to believe that either gold, lead, or any other substance had been used for stopping teeth by the ancient Egyptians;—and it is satisfactory to know that Mr. Coleman's inquiries on the spot have served to confirm this statement. I am inclined to think that the statement is in all probability attributable to that gilding of the face and the front teeth which may be seen in some mummies. One very fine specimen of a head has been presented by my friend Mr. Lockhart to the Museum of the Royal College of Surgeons. In this case the entire skin of the face and the lips had been gilded, but the interior of the mouth is not visible. I am satisfied that Mr. Coleman has thrown an amount of light on the subject which has not before been brought to bear upon it, as the travellers who had investigated the matter were without the professional training which enabled him to examine it as he has done. I congratulate him on his return in such improved health, and am sure it gives us all pleasure to see him again among us.

Mr. BARRETT said, I think it possible that the artificial frames in the mouths of Egyptian mummies may have been caused by the materials used in preparing the bodies. Spice and gums were placed in the mouth ; these hardened, and produced a coating over the teeth, filling up all the interstices, and perhaps gave the impression that frames had been employed during life.

After a pause,

The PRESIDENT said, As no other remark is forthcoming, we may now conclude by thanking the authors of the papers, more especially Mr. Coleman. I thought he went to Egypt merely to recruit his health, and that he would have avoided dentistry ; but the spirit of inquiry has travelled with him, and it seems that he indulged himself in Egypt in looking at the natives' teeth as well as in recruiting his health.

The Committee appointed by the Odontological Society to investigate the question of poisoning by coloured vulcanite will be greatly assisted by members of the profession forwarding notes of cases which may have come under their observation. To facilitate classification, the Committee would beg more particular attention to the following points. The general health, and as far as possible the previous history, of the patient. The condition of the mouth in regard to roots, or unsound teeth. A careful distinction between mechanical and chemical injury. The kind of rubber used ; the manner of curing or cooking, and, if possible, the name of the manufacturer. All communications will be received as confidential, unless otherwise specified.

Any information tending to throw light on the question, addressed to 40, Leicester Square, will be received with thanks by

JAMES SMITH TURNER,
Honorary Secretary,
Odontological Society.

GENERAL MONTHLY MEETING.

Monday, June 7, 1875.

JOHN TOMES, Esq., F.R.S., President, in the Chair.

The Minutes of the last Meeting having been read and confirmed,

The following gentleman was elected as a non-resident member :—

David Amos Wormald, Esq., D.D.S., Bank-street, Bury, and Talbot-street, Southport.

The following gentleman was proposed as a resident member :—

Frederick Canton, Esq., M.R.C.S., 18, Great Marlborough-street, London.

And as a non-resident member :—

Thomas C. Stellwagen, Esq., Chestnut-street, Philadelphia, U.S.A.

Mr. Charles Tomes.—There are some few things which have been acquired by the Museum lately that are, I think, of sufficient interest to deserve more than mere enumeration. Mr. Todd has presented two very good specimens of heads of kelts or foul salmon,—that is, salmon at the spawning season.

At such periods the male salmon develops at the front of the lower jaw a curious upgrowth, which is used by the males for fighting purposes; it is a sexual weapon employed for driving away any other males who may approach the spawning female. When the salmon again becomes a clean, takable fish this upgrowth entirely disappears. Two examples of teeth employed as sexual weapons have been lately acquired by the Museum. Two skulls, of the male and female wild boar, have been presented to us by Mr. O'Meara, of Simla. The canine teeth in the boar are largely developed. In the female the tusks are small, while in the male of the same species they are very large. The same gentleman has also sent us the head of a Muntjac deer. This deer is peculiar in not having horns, or rather having very short ones, the male, in place of horns, having strongly pronounced canine teeth. Canine teeth are entirely absent in most of the deer tribe, but in this and in the musk deer the canine teeth are strongly developed, and serve as the weapons with which the males fight. There is another peculiarity well shown in this specimen,—that is, that the acquirement of a sexual weapon, such as this strongly pronounced canine, happens only when the animal has attained sexual maturity. On the inner side of and behind the large canine there is a temporary canine, which is a perfectly insignificant tooth not capable of answering the purpose of a weapon. That is true of most teeth that serve as sexual weapons, that they are only strongly developed in the adult male. We have also had some very valuable donations from Mr. Waller, of Cairo, which have come to us through the hands of Mr. Coleman. Amongst others, there is a very fine rostrum of a saw-fish. I have brought from the museum this little dried saw-fish, for comparison, because it shows what the position of the rostrum is, and that it has no relation to the true teeth which are found upon the margins of the jaws. A fish, interesting in its dentition, has been sent by Mr. Waller, of Cairo,—a tetrodon; so called because it appears to have four naked teeth, uncovered by the lips, in front of the mouth. Several other new specimens are here which, as we have a good deal of business to get through, I will not allude to. But I cannot refrain from calling the attention

of the Society to the specimen which I hold in my hand. It is a specimen lent to the Museum by Mr. Bennett, and is almost unique. It is not, however, quite unique. I learned accidentally from Mr. Erxleben, the engraver who illustrated a large portion of Prof. Owen's Odontography, that there was another similar specimen. The peculiarity is in the large size of a foreign body which has entered the growing pulp of an elephant's tusk, without materially interfering with its growth. When the tusk is fitted together there is nothing very noticeable on its outside; it is of the same diameter and the same general appearance as it would have been if there was nothing peculiar inside. When it came to be sawn in pieces, a spear-head was found imbedded in it, quite immovable, dentine being found all round it. The way in which it got there you may see by looking at this skull of an elephant, (which is a recently purchased addition to the Museum). Traps are set for elephants along the tracks by which they go to water. These traps consist of a very heavily loaded spear, which is intended to fall upon the elephant's skull and pierce its brain. The spear in this instance, instead of piercing the elephant's brain, has struck into the open end of the tusk which looks upwards; it has entered the growing pulp, and has there broken off. Instead of exciting an amount of inflammation, destructive to the power of growth, the growth of the tusk has gone on, and eventually the spear-head has been carried outside the alveolus, and has become located in the solid tusk. Of course there is a little disturbance of growth about it. The pulp-chamber is not quite simple; there is a little secondary dentine formed, but not very much.

The following communications were then read:—

On a Method of Pivoting. By Mr. Moon.

Mr. President and Gentlemen,

I have undertaken to make a casual communication to this Society on a method of pivoting—not so much because I have anything particularly novel to bring forward as regards the

method of performing this operation—as because I am wishful to draw attention to and evoke opinions upon a *principle* in our treatment of tooth disease, which has been passed over by distinguished writers on Dental Surgery, and has (I think) somewhat fallen into unmerited neglect. The principle I allude to is that of leaving a permanent vent open for the escape of products of decomposition—purulent fluid and gas—which, being pent up within the tooth, or contained in an abscess sac around the end of a root, are pretty sure to necessitate the loss of the tooth, and may give rise to extensive mischief. The "safety-vent practice" can, I believe, be with advantage adopted in certain cases of pivoting, in many cases of stopping of teeth, in which the pulp is dead, and in the allied cases where necrosis of pulp has resulted from rupture of its nutrient vessels. In practice, given the desirability of saving a tooth's crown by stopping, or of retaining a root for pivoting, it seems to me that, whenever there is evidence of periosteal inflammation being established, or a suspicion of the formation of alveolar abscess, it is far better to adopt this plan rather than to attempt fang-filling after any amount of dressing.

Again, when roots cannot be thoroughly stopped, either on account of their position or minuteness, it is, I believe, better, after extirpating the pulp, to leave root canals empty, and give them a vent, rather than to put an unsatisfactory filling into them.

In carrying out this principle in the case of pivot teeth, the plan I adopted some half-dozen years ago, and have constantly practised and taught since, is the following :—

Having extirpated the pulp and syringed out the root canal, the bore of the latter is equalized to the depth of half an inch (or less, according to the length of the root), cylindrical burs of graduated sizes being used for this purpose. The root-barrel is then rifled with a small excavator, and a platinum tube (the same as used for lining pin teeth) is packed in with amalgam ; the patency of the canal and the tube is insured by retaining a piece of pin-wire in them until the tube is fixed in place. The amalgam being set, an impression is taken, the exact direction of the tube being shown by inserting into it a piece of pin-wire.

A root treated thus is preserved from further decay. The crown is affixed by a split gold pin, which may be narrowed in one direction if much vent is required. In applying this principle to teeth that have to be stopped, rhizodontrypy is performed. A small vent-hole is drilled into the pulp-chamber at a point just below the free edge of the gum; into this hole a pin-wire is passed. The pulp-chamber, with its extensions into the roots, is covered over by a pad of gold-foil, vulcanite, or some other cap. The crown is then filled and the wire withdrawn. When there is an amalgam stopping at the neck of the tooth, a canal may be drilled through it; or, if a cavity has to be filled in this situation, one end of a wire can be placed in the pulp-chamber, a stopping introduced around it, and the wire afterwards withdrawn.

I would mention, from among others, two cases to illustrate the value of this treatment:—A friend of mine had in his mouth the root of an upper lateral incisor, the subject of alveolar abscess, which at frequent intervals gave rise to a swollen face, and the flow of pus from which was so large that an eminent surgeon concluded dead bone was present. This root—pivoted on the above plan—has for years supported a crown with perfect comfort. Second case: Some months back, a young lady came to me suffering considerable constitutional disturbance as well as local discomfort, due to an alveolar abscess which had just burst into the nares, and which was connected with an upper central incisor. The tooth was at once re-stopped (in the above-mentioned manner), and neither tooth nor abscess has given further trouble.

Since penning the foregoing remarks, I have had the pleasure of reading Papers which were read before this Society some ten years back by Mr. Cartwright and by the late Mr. Hulme. In both these papers somewhat favourable views were expressed with regard to the original operation of Dr. Hullihen, or modifications of it; but neither author advocated the practice of ventilation by the means that I now feel justified in recommending.

I must conclude by apologizing for the length to which this communication has extended.

The PRESIDENT.—Mr. Moon has introduced a very important subject and in a very lucid manner. It will now be for the members to express their opinion upon his manner of treatment. There must be many present who have at times had recourse to treatment somewhat similar to that which Mr. Moon has described, and who are therefore in a position to give us their testimony.

Mr. CHARLES JAMES FOX.—I may mention that at the Dental Hospital very recently there was a case of pivoting done by a student. After the operation was performed there was a considerable amount of irritation. It lasted some weeks, and all attempts to subdue it failed. I suggested the use of a hollow pin, and it proved, I believe, a success. I see the House Surgeon, Mr. Merson, present, and probably he will be able to support what I say.

Mr. JAMES MERSON.—The case alluded to by Mr. Fox was that of a lad aged 11, who had a tooth pivoted at the Dental Hospital in the following manner:—the root was cleared out and dressed in the usual way, a tube was inserted and amalgam carefully packed round it; when set, the tooth fastened with a pin was inserted into this tube. The patient occasionally returned with an alveolar abscess, which readily yielded for a time to the usual treatment of lancing and syringing out the canal. At the same time the lad was desired to discontinue wearing the tooth for a few days. As this patient usually called when Mr. Fox was the officer of the day, I brought the case under his notice, thinking he might suggest some plan to prevent the constant recurrence of the abscess, and he advised the use of a hollow pin in the place of the solid one first worn, so as to allow of the exit of any gas that was formed. This plan being adopted, the case has since gone on most satisfactorily.

Mr. MOON.—The objection to fixing on the crown by means of a tube would be that such tube would get blocked by food, &c. By using a split pin (the diameter of which can be lessened in one direction if desirable), you allow sufficient vent to prevent any accumulation of the products of decomposition in the interior of the root, and at the same time exclude food.

The PRESIDENT.—Had I known of Mr. Moon's paper this evening, I could have brought a box of small tubes prepared many years ago, but few of which were used. They were made of very thin gold tubes—a square piece of thin gold soldered at one end, and a little gold plug fitted into the other. These were supposed to be inserted into large cavities in molar teeth where the pulp had been destroyed, and packed in, leaving this small pin to be withdrawn in case the tooth became uncomfortable at any time. In my own practice they were used for a time, but the success of the operation was not generally sufficiently encouraging for systematic adoption. At some other meeting I will bring specimens.

The PRESIDENT then called upon Mr. Coleman for his communication on the subject of supernumerary teeth in the temporary series.

Mr. COLEMAN.—With my first communication I will only occupy the Society for a very few minutes. The late Mr. Harrison, some four or five years ago, drew our attention to the subject of supernumerary teeth in the temporary series. I think he mentioned the number of cases that he had met with, and at that time I had been favoured in my opportunities for seeing them, as I had met with six. Very recently I saw a seventh in the case of a little child. Why I wish to call attention to the subject now is that within the last few weeks I have had the opportunity of seeing two of these patients. In both the permanent series have been erupted, in one in a normal condition; whilst in the other case the two temporary laterals are succeeded by two permanent ones, or by a permanent lateral and a supernumerary tooth, as seen in the model before you. Another subject that I have to bring before the Society is of a much greater interest and importance. Cases have occasionally but rarely been described, in which irritation at a dental extremity of the fifth pair of nerves has given rise to temporary or permanent loss of vision. The following case, although it may be doubtful whether such was actually the case, bears so strongly upon this subject, that I am sure the

Society will be interested in my reading the notes of it as given me by Mr. F. J. Bennett, under whose care the patient came at the Dental Hospital.

Notes on a Case of Pivoting, followed by the temporary Loss of Sight of one Eye. By Mr. COLEMAN.

THE patient from whom the following notes were taken was a girl twenty years of age, robust and cheerful, and appears to have been in good health. She first attended the Dental Hospital to have some teeth stopped, and whilst under treatment expressed a great desire to have one of her front teeth pivoted which had been broken off some months previously.

It was therefore arranged that it should be done so, and on the 8th of April last the operation was commenced. The tooth, which was a right upper central incisor, had its crown fractured obliquely across, and was of a dark bluish tinge. What remained of the pulp was decomposed, and discharging very offensively. On applying a soft broach to the nerve canal it passed quite freely up the length of the fang, though there was slight uneasiness at the extremity of the canal. This was thought to be due to some slight vitality of the pulp. The crown of the tooth was then filed off and the nerve canal mopped out with a little carbolic acid, once or twice, and a very light carbolic acid dressing left in the fang.

Unfortunately the case could not be gone on with for a month. Notwithstanding this delay the case seemed to go on well, and after one or two more dressings the fang was found to be quite free from discharge and unlpeasant smell; there was, however, still slight tenderness at the periphery of the nerve canal, and also an uneasy dull pain in the gum over the root. There was no swelling, and no symptom of Periostitis.

An impression was then taken in Stent's composition by means of a small tray with a movable pin attached to give the direction of the nerve canal. Two or three days afterwards the patient returned to have the pivot inserted; the root presented the same appearances as before, the only difference being that the pain in the gum had rather increased. The dressing being found perfectly sweet, and no increase of pain occurring on

trying in the pivot, after some slight adjustment it was inserted, and the patient sent away with the understanding that, should the pain increase, she might easily remove the pivot herself.

It will be seen that the mode of attachment was by means of a gold split pin; this method having been thought most suited to the case. No tube was inserted into the root, and the fang being straight and rather large was not drilled into at all.

The patient was seen the next day and for two or three days afterwards; the pain remained the same, but gradually the right eye became affected—the pain being described as an irritating, burning sensation, with a strong aversion to the light. The conjunctiva was also congested. No other abnormal appearance was noticed, however. Finding at the end of three days that these symptoms increased rather than diminished, and that the vision of the right eye was becoming affected, it was thought advisable to send her to the Middlesex Hospital to be examined. She was accordingly seen by Mr. Scott, the House Surgeon, who showed her every attention. An examination with the Ophthalmoscope was first attempted, though unsuccessfully, the eye being too irritable to bear the necessarily strong condensed light. After a careful examination he came to the conclusion that it was probably due to the pivoted root, and that, therefore, it had better be removed at once. He also gave her the following:—

"Fotus Belladonnæ ..... t · d · ut."

and told her to wear a shade over both eyes. The patient, therefore, returned at once to the Dental Hospital, and the root was extracted under the gas, being just five days after the pivot was inserted. The root appeared perfectly healthy, and there was no discharge of pus whatever. The patient returned the next day, with the eye still inflamed, the vision being still very indistinct, and the pupil dilated. It was, therefore, determined that on the following day the opinion of Mr. Lawson, an ophthalmic surgeon at the Middlesex Hospital, should be obtained. Having examined the eye carefully, he

gave it as his opinion that the irritation and loss of vision were in no way due to the pivoted root which had been removed, but entirely due to constitutional causes, and that the sight would soon return if she lived well and went into the country for a week or so; he ordered her the following prescription :—

℞ Liq. Cinchonæ..... ℥xv
Tinct. Belladonæ..... ℥v
Acid. Nit. dil. ..... ℥x
Aquæ ..... ℥i
hst. bis die.

Et Fotus Papaveris.

And also advised her not to overtax her eyes.

On returning to the Dental Hospital two days afterwards she had entirely lost the sight of the right eye, though the irritation was much less. The patient still continued at the Dental Hospital, and also as an out-patient at the Middlesex, under Mr. Scott, at intervals of two or three days; the sight gradually returned, though the pupil remained fixed. Since then she has been in the country for a week, and on returning the sight was so much better that she could see to read small print, though not for any length of time; the pupil had also regained its normal state. The pain had now quite left her, and all signs of inflammation.

I may mention, that my own impression would certainly be that this irritation at the extremity of the fifth pair had really a great deal to do with the condition of this patient as regards the loss of vision. However, I should be sorry to place my opinion of such matters in opposition to that of Mr. Lawson. There is, however, no doubt that with the extraction of the tooth, at all events after an interval of a few days, the patient recovered sight in the eye affected.

The President.—The remarks that Mr. Coleman has brought before the Society will, I hope, elicit some discussion. The subject is certainly very interesting, more especially as there is a difference between the doctor and the dentist, if we may so designate two classes of practitioners.

Mr. Sewill.—Has Mr. Coleman any report of the exact ophthalmoscopic appearances presented from the ophthalmic surgeon who examined the patient? Was there any appearance of lymph about the iris?

Mr. Coleman.—There was, I am informed, such intolerance of light that no examination could be accomplished. The patient had been subject to rheumatism, but the irides were clear in both eyes, without the least appearance of lymph or adhesions, and the iris readily dilated by belladonna.

Mr. C. Tomes.—There are two points about the case which appear to me to be of interest. In almost all the cases where there has been a temporary loss of vision, unaccompanied by any marked structural changes in the eye, and it has been attributed to dental irritation or to similar irritations, the cure has taken place with almost startling rapidity after the removal of the exciting cause; whereas in this case, so far as I gather from the notes read, the loss of vision went on increasing even after the removal of the stump; at all events, it was not any better. We are told that there was complete loss of sight some days after the removal of the stump, and that, so far as it goes, seems to militate against the supposition that it was due to irritation set up by the teeth. At any rate, that is not the clinical history of most cases which seem to me to be clearly traceable to the irritation of diseased teeth.

Mr. Turner.—It seems to me to be rather an anomaly that there should be loss of sight and yet intolerance of light. These two circumstances point to very different sources of irritation.

Mr. Charters White.—I can only remember one case in my practice that bears upon this. The patient lost the sight of her eye from opacity of the cornea. She was of a strumous disposition, and she was exceedingly anxious that I should save her tooth for her, an upper bicuspid. I did all I could. I got the tooth into a fairly healthy condition and stopped it. Soon after a great deal of irritation was set up, and periostitis supervened, but still she would not part with her tooth. Gradually

opacity came on, this increased, and yet she held on to the tooth, maintaining that it was not the cause of the mischief. The opacity began in the left eye, the right eye soon after becoming affected in a similar manner. After a great deal of persuasion I prevailed upon her to have the offending tooth out. She then went down to Hastings for a time when the opacity began to diminish, and the left eye got nearly clear again, but I am sorry to say that the opacity has now returned, showing that the girl has a thoroughly unhealthy constitution, but probably the tooth was the exciting cause in setting up the ocular disturbance.

Mr. Coleman.—With regard to the remark of Mr. Tomes, the difficulty that he mentions did not occur to me when I saw the patient, but, after reading Mr. Bennett's notes, I understood from the patient that the moment after the removal of the tooth the improvement began to take place. Although I agree with Mr. Tomes, that in most of those cases where the loss of sight or other injury to the eye is caused in this reflex way, we usually get a rapid recovery, I do not see that it is absolutely necessary that it should be so. Sometimes a patient will complain of pain and refer it to a tooth. You remove the tooth, and perhaps the patient will come in two or three days and say that he has suffered a great deal worse than before, but in the end he is relieved from the pain. I do not think it follows that because immediate relief was not experienced the tooth was not the cause of the pain. It was remarkable that within a short time after the removal of the tooth, the disagreeable symptoms passed away. With regard to Mr. Turner's very natural observation as to there being intolerance of light with loss of vision, the examination was attempted before that had occurred.

Mr. C. Tomes.—I did not intend to say that we understood much about these cases of reflex irritation. In fact, the expression I used was a guarded one, simply that such was not the clinical history of such cases as we are acquainted with; that it might not be the clinical history of some future cases I was not prepared to say. With regard to those patients

who came to us complaining that they have more pain after a tooth was out than before, they are, so far as my limited experience goes, patients in whom there has been an amount of violent local inflammation, which may have been aggravated into greater temporary activity by the mechanical violence of extracting the tooth. I do not know of any instances of reflex pain—neuralgic pain—felt at other spots than where the tooth was, more prominently than in the tooth itself, where the pain has been exaggerated long after the removal of the tooth. It appears to me that the cases in which there has been exaggerated pain after the removal of a tooth are almost entirely those in which there has been a local inflammation. These cases of reflex irritation manifested by a loss of sight are precisely of an opposite nature. Where ophthalmoscopic examinations have been made, in no single instance that I am acquainted with has there been anything that we could term a severe local lesion. The most that I am aware of as having been reported is a little hyperæmia, but in many cases there is actual anæmia of the retina, a condition of things which I respectfully venture to submit is not analogous to the violent inflammatory action that you may have around a tooth.

Mr. James Merson.—Before this discussion drops on the possibility of impairment of vision in one eye or both due to the irritation of the teeth through reflex action, I should like to mention a case that came beneath my observation at this hospital some five weeks since. It was that of a woman who had applied elsewhere for the extraction of an upper molar; a fortnight or so after, she came here with an abscess in the antrum. This readily yielded to the usual treatment of an injection of an antiseptic and astringent nature, combined with constitutional treatment.

When she first came, one of her principal complaints was that she could not see to *read now;* that she suffered great pain *in* the eye,—not around; that everything was very hazy. Now the curious and undisputed fact of this case was that as I reduced and cured the antrum mischief, the sight was gradually restored, much to the delight and satisfaction of the patient.

With reference to the case Mr. A. Coleman has just read a few notes on, to the best of my recollection, being a constant watcher of the case, after the *removal* of the stump the patient daily recovered or regained her usual sight.

Mr. Fox.—I have here a very simple instrument, the invention of Mr. Owen, of Islington, and I may add, the work of his own hands, and an exceedingly neat piece of work. It is intended as an improvement upon the old tin plates for folding gold, as it folds the gold in a more uniform manner. I need not describe it, as it tells its own tale at once. By turning a screw you gain the different thicknesses of gold that you desire.

The PRESIDENT then called upon Mr. Makins for his paper on Palladium Amalgams.

On Palladium Amalgams. By Mr. G. H. Makins, M.R.C.S., F.C.S.

Mr. President and Gentlemen,

From remarks which have been made to me from time to time by some who are in the habit of employing the valuable amalgam of palladium with mercury, it seems that not unfrequently there is much uncertainty in the resulting combination, dependent upon some manifest and very active chemical action taking place, and this, at times, so energetic as to induce overheating of the compound to the extent of even developing explosion.

Occurring, as this accident does, in some specimens of palladium and not in others, we are directed for its cause to peculiarity in the metal, and that, probably, the result of some particular method of preparation of the spongy or pulverulent form used.

Considering that the amalgam, when made without such accidental drawbacks, has so many recommendations to its use, some little inquiry as to their cause and origin seems to be quite worth entering upon.

The manufacture of palladium and the production of the spongy form are in the hands of a few manufacturers only in our country; indeed,

Messrs. Johnson, Matthey, & Co. are the principal producers, and it is, moreover, a process only profitably carried on by such a firm; and again, as little has been published upon it, I shall offer no apology for asking your attention to some points which might otherwise be considered elementary, and shall, therefore, first say a few words upon the sources of the metal and the plans for the preparation of the spongy form.

Now, although palladium is one of the associate metals of platinum, in the ore of the latter its relative amount is very small. In several published analyses by Berzelius and others, the highest amount named only reaches 1·10 per cent.; and hence, palladium was esteemed a rare metal. But its properties and actions studied, it soon came to light in a source whence for some years it was much more abundantly obtained, viz., in Brazilian gold-dust, and hence its price fell until about £1 per ounce was the usual cost; indeed, it was at one time sold as low as 14s. per ounce. Australian gold coming into our market and the Brazilian supply falling off, the yield of palladium again diminished to such an extent as to raise its price to the present high one at which it is sold; and, considering the highly injurious effect which palladium has upon the malleability and ductility of gold, it is no wonder that our refiners and bullion merchants should be careless about the supply of a gold-dust containing it.

It is found in this gold to the extent often of 5 to 7 per cent., and its separation is an easy operation; indeed, it is principally the ordinary wet operation of gold refining; but the palladium being dissolved out in company with the silver by means of nitric acid, these two metals have to be subsequently separated. Thus, the details of the operation are, first, the fluxing of the gold-dust for its preliminary purification, then the ordinary quartating operation by fusing with silver, and having granulated the alloy, boiling it in nitric acid. The nitric solution poured off from the residual gold is treated with sodic chloride to throw down all the silver as argentic chloride. The palladium is now recovered by acidulating the solution with some sulphuric acid, and then putting in plates of zinc. Thus it is thrown down, but with it also any platinum, copper, iron, or lead present. Thereupon, the brown powder precipitated is digested in ammonia, by which the greater part of the palladium and the copper will be dissolved, and these two are finally separated by the addition to the solution of some hydrochloric acid, by which the palladium goes down as a double chloride of palladium and ammonia, whence, on heating, a pulverulent or spongy residue of palladium is left.

But the spongy preparation of palladium is produced from the metal by other methods, and

one, by which much of the palladium which comes into your hands is prepared, consists in first forming a sulphate of the metal, and then treating this solution with ferrous sulphate. This latter agent throws it down in the metallic state, just as it does gold, and in very much the same physical condition as to coherence and sponginess.

These methods of manipulation and treatment, as also that where mercuric cyanide is employed, give resulting metal not very greatly differing in character; and hence, it may naturally be asked, why the precipitates should, in the hands of some practitioners, give such uncertain results when treated with mercury for amalgamation.

Presuming that pure mercury is employed, and that the operator is careful to have it in excess so that the actual amalgam is dissolved or suspended in the excess, this latter being squeezed out before introducing the amalgam into a cavity, —these precautions being observed, I think most operators who have much used this amalgam will testify to its union with, but slight evolution of, heat; and the fact of the ease with which it is manipulated in practice, and the ultimate good result of a solid plug of an alloy of noble metals, which has, moreover, slight expansion on setting, are all points greatly in its favour.

But the question as to the cause of the excessive heating of the amalgam which sometimes

occurs in the mass, even rising to a point at which, from the same causes, explosion may take place in the substance of the material, no doubt, is to be answered by pointing to another fact, which I will briefly enter upon.

In 1868 the late Professor Graham discovered that some metals when brought in contact with nascent hydrogen, under certain conditions, will take up large amounts of the gas, and from the little apparent change to external appearance in the metal employed, he termed the action occlusion of the gas; and on the often mooted theory that hydrogen is the vapour of a highly volatile metal, he says that "the idea forces itself upon the mind that palladium, with its occluded hydrogen, is simply an alloy of this volatile metal, in which the volatility of one element is restrained by its union with the other, which owes its metallic aspect equally to both constituents."

The metals in which this property has been observed are palladium, pure tin, nickel, and cobalt in plates; but of these palladium possesses by far the greatest power of occlusion.

Graham obtained his results by electrical action, and experimented with a small battery and an ordinary voltameter. In the latter instrument, however, in place of employing two platinum electrodes as usual, he made the positive pole or electrode of platinum wire, and the negative of

the metal to be tested as to its power of occlusion; palladium, for instance.

On putting the arrangement into action and decomposing water, the hydrogen which would have been evolved from a platinum negative electrode was with a palladium one absorbed by it, and that for an hour to an hour and a half of action. After this time the palladium pole, on being removed and examined, was found to have increased in length nearly a 50th part, and thus, accurately speaking, an original length which might be represented as 100 had become 101·605, the bulk also having increased. Calling the cubic measure 100, its gain was to 104·908.

At ordinary temperatures, beyond this increase of bulk, no sign of the actual condition of things is apparent, but immediately the metal is strongly heated the gas begins to be again separated from it. The wire is now, therefore, heated in a glass tube, and the gas evolved collected and measured, when, in the case of palladium, no less than 936 times the volume of the original electrode was found to be occluded by it.

The expulsion of the hydrogen from the wire is attended with extraordinary contraction of the latter, for it not only recedes to its original length, but falls below about as much as it had increased. But as the density did not increase, it proves that the wire contracts in length only.

Graham's own explanation of this is, that it results from the wire in drawing having its particles left in a state of tension in the direction of its length.

Although evolution of the hydrogen takes place directly on heating, yet in a piece of palladium foil charged and heated to redness, so that a drop of water placed on it will hiss, the hydrogen is not all expelled again without heating for a considerable time to redness. Palladium will, under other conditions, take up hydrogen; for example, if heated in vacuo, and then plunged into the gas. Without this preparation by heating, as above, the action does not go on. Two experiments were made as follows:—A piece of foil weighing 1·58 grammes (equal to 24·401 grains), as taken from the manufacturer, was heated in vacuo for an hour, when it gave off 1·50 cubic centimetres of hydrogen. It was next heated in hydrogen to 245° Centigrade, and subsequently allowed to cool slowly, so as to favour absorption of the gas. This over the metal was transferred to a distillatory tube, and appeared at 17·8° Centigrade (about 64° Fahr.) to give out nothing; but on putting under it a combustion furnace, gas came off freely to the amount of 69·92 cubic centimetres, the one volume of metal occluding 526 volumes of hydrogen.

The second experiment was precisely similar,

except in using a temperature of 90° to 97° Centigrade for three hours for the absorption, when the palladium was found to have taken up 643·3 volumes of hydrogen. Spongy palladium obtained by ignition of the cyanide was found even more absorbent than this foil, 686 volumes being taken up.

I may just remark, that alloys of palladium show just the same power of occluding hydrogen when the alloying metal does not exceed half the alloy, but alloyed wire returns to its original length without any shortening. And again, that the occlusive power is peculiar to hydrogen, for spongy palladium was examined as to its power of absorbing oxygen or nitrogen, and it was found that not the smallest occlusion of either took place.

I may here mention another curious fact, as bearing also upon the subject. Boettger placed a plate of platinum in a solution of palladic chloride, and then submitted the latter to electrolytic decomposition; thus, he deposited palladium in a spongy state upon the platinum. In fact, he carried on just an analogous operation to that by which the silver plates of a Smee's battery are covered with spongy platinum. Next, on removing this palladiumized plate from the cell, and drying it rapidly by bibulous paper, it spontaneously increased so much in temperature, that

after a few seconds it was in a bright glow, and he found that if wrapped in gun cotton the latter was exploded by it.

I have ventured thus to bring forward facts, some of which have been some time published, and may consequently be familiar to many here; but I consider that they bear so directly upon our subject that I have not scrupled thus to bring them together, in a condensed form, for your consideration.

In amalgamating palladium with mercury I believe that we get true chemical action set up, and that some of the resulting amalgams are definite chemical compounds, analogous to some of the well-ascertained compounds of silver with mercury. The heat evolved during union, together with the rather rapid change of form or solidification of the at first pasty amalgam, to a great extent tend to the same conclusion, notwithstanding that it may be urged that all bodies in passing to a more dense physical state evolve heat.

These amalgams, it is true, are decomposed by heat, but it is only completely done at a very full red heat, approaching whiteness. At this point the mercury is evolved, and palladium left. Upon these views I have made some experiments, using palladium and mercury in atomic proportions, and afterwards submitted them to examinations

first subjecting them to strong pressure, so as to separate all the uncombined mercury, and then examining the residual amalgams, and although I have not in all cases obtained perfectly definite combinations, yet I have got results which go far to corroborate the belief that atomic or chemical combinations are the rule in these cases.

First, the metals in the proportion of one atom of palladium to 3 atoms of mercury were worked together, and allowed to stand for a time; here combination seemed complete, considerable heat was evolved, and a grey pulverulent mass obtained, from which no mercury could be squeezed out, even by very strong pressure; in fact, it was permanent, as a compound of 1 atom of palladium with 3 of mercury.

Next, 1 atom of palladium was treated with 5 atoms of mercury, and similarly pressed. After all mercury ceased to squeeze out it was removed and analyzed, and found to consist of 1 atom of palladium with 2 atoms of mercury.

A third experiment, similar to the first, was now made upon proportions of 1 atom palladium and 3 mercury, and pressed before it hardened: this gave out mercury and a compound of 1 palladium with 2 of mercury remained.

Next, 1 atom of palladium was mixed with 6 atoms of mercury. With this excess of mercury the result was not so satisfactory, as it gave, on

analysis, 1 of palladium with rather over 3 atoms of mercury; in fact, enough excess of the latter to prevent my noting it as a compound of 1 atom with 3. And on repeating this experiment with similar large excess of mercury, a second uncertain result was arrived at.

Supposing such strongly-pressed amalgams with no great excess of mercury are used in practice, very quick manipulation would be required, for they set generally rather rapidly, and ultimately become very hard. But where the mercury is in greater excess, this hardening is much more gradual. And I have no doubt but that the latter condition is the one in which these amalgams are worked by those who most successfully employ them. Indeed, in some old stopping which I examined I found such to be the case, and the mercury largely in excess of 2 or 3 atoms to 1 of palladium, although, nevertheless, the stopping was hard and solid.

Now, considering the trustworthy testimony as to the almost explosive condition of some of these amalgams, we may assume that such do at times occur. In my own experience I have failed to produce such violent action, although I have tried to do so, using different methods of manipulation, and different specimens of palladium in order to bring it about. And I must here express my obligation to Mr. Matthey and Mr. Sellon, for

kindly supplying me with various specimens of palladium for the purpose.

I think that where they do occur they may fairly be attributed to some action dependent upon the displacement of Graham's hydrogenium, by the superior affinity of the palladium for mercury, and the consequent sudden resumption of the gaseous state by the hydrogen (or hydrogenium).

In conclusion, although speaking without the practical experience of most around me, who have employed this amalgam for fillings, I cannot help thinking that it must be a most useful one. It is easily and quickly formed, and I believe that with a fair excess of mercury, and care in manipulation, it is commonly free from some of the defects, or I may say accidents, attributed to it. While thus advising an excess of mercury, I may observe that this does not interfere with its attaining a sufficient degree of hardness, for amalgams containing mercury in excess of two or of three atoms become quite hard. Indeed, in some cases these set so speedily that they need tolerably quick application. In the specimens of old stopping I have examined, I have found such excess on analysis. Where this is the case, they generally blacken more or less in the mouth, having at times even the appearance of coal from their glossy blackness.

Lastly, there is in palladium amalgams just

that amount of expansion when they set which ensures a solid plug. I have taken the specific gravity of some, and in cases where, from the relative amount of the constituents, the calculated specific gravity would be about 13·1, I found it was really only 12·62, showing, you will observe, a slight but sufficient expansion on solidification.

In bringing these matters thus briefly before you this evening, I trust I have not employed your time and attention unprofitably.

Discussion.

The President.—Mr. Makins has brought before the Society several matters of great interest, and given us much information that we did not possess before. It is a subject in which every member of the Society is interested. I take it that on this side of the Atlantic there are very few, if any, practitioners who wholly avoid the use of amalgam. I hope therefore that we shall have an ample discussion on the subject. I have no doubt that Mr. Makins has not exhausted his own resources in the way of information, and that we shall be able to get from him still more than that which he has formally communicated by means of his paper. Before discussing it I would ask him to describe his method of mixing.

Mr. Makins.—It is done by first putting the mercury into a small agate mortar, then adding the palladium, spreading and rubbing over a considerable surface without bringing it into a mass too soon. Subsequently, when the amalgam is just setting, I submit it to just sufficient pressure, and bring it into a small ball. I happen to possess peculiarly fit instruments for taking these specific gravities, but with regard to this point, they are taken in the ordinary way with distilled water, but suspended by a single film of silk. In this way one gets very accurate results.

Mr. Underwood.—I should like to ask Mr. Makins, who is an authority upon these matters, if he can throw any light upon the fact that some of the preparations of palladium that we have recently had, have been extremely defective. Some that I had I sent back to Messrs. Johnson & Matthey, and they sent me in exchange another packet, but that did not answer its purpose. The third packet that I got from them was somewhat like the old palladium that we used to have. Within the last eight or nine months I have found none of the palladium work

as readily as before. It appears to me that it is in too fine a state of powder. One has to expel the mercury, and in expelling the mercury you get rid of the palladium itself. You may take the ordinary amount of palladium necessary to make a fair stopping for a cavity, and put the usual amount of mercury to it, but you will find that you have no stopping left. That is the difficulty I have found with the recent preparations of palladium that I have had. I do not know whether Mr. Makins can explain it. The last packet we had was freer from that defect, and I was enabled to make better stoppings but at a larger expense for palladium itself.

Mr. Makins.—I believe it does depend on the state of division. Mr. Sellon kindly sent me some time ago three forms of palladium. One of them does not work well. It has the defect that my friend Mr. Underwood has mentioned,—much of it passes through the cloth or muslin with the uncombined mercury. There is a second specimen which Mr. Sellon told me, when he sent it, was likely to explode; he believed that it contained occluded hydrogen. You will find that it is a perfectly clean powder, looking much like very fine gunpowder. It amalgamates beautifully; it produces these atomic combinations better than any other form. I believe it is a very fine pulverulent condition of the palladium that interferes with its amalgamation. Many of you are familiar with the old medicine composed of rhubarb and camomile powder, known as Gregory's powder. If that is properly made it is exceedingly difficult to mix it with water; the fine powder floats on the surface, although diligent stirring is kept up. It is much the case with some of the specimens of palladium. They do not mix (I may say, do not wet) readily with mercury, from this finely divided state. I have no doubt, however, that when facts of this nature applicable to your practical needs are pointed out to Johnson & Matthey, they will overcome the difficulty, and you will get from them just what you want. They are probably not aware of the exact kind of material you require for your purpose. I think I omitted to state that these specimens were produced from a solution of the spongy metal,—viz., from

sulphate of palladium, and this is precipitated by ferrous sulphate (sulphate of iron). When this is quickly done, and with heat, you are apt to get occluded hydrogen ; but it seems to be rather an advantage as regards the amalgamating properties of the metal, although it is more apt to produce this explosive action. That, however, may be avoided by careful manipulation. Mr. George Matthey told me that he had often had specimens that would explode between the finger and thumb if rolled between them. It is entirely a question of careful manipulation, and also of the quantity of mercury used.

Mr. C. S. Tomes.—There is one little practical matter that I should like to mention. I have lately had some palladium myself, which I am assured comes from Messrs. Johnson & Matthey, and which has all the appearance of perfectly pure palladium, but, whether from some molecular condition or what not, it does not set with great rapidity,—in fact, you cannot treat a filling made of it as you can an ordinary palladium filling. Practically the palladium which does not set quickly at the time makes very imperfect fillings. The edges of the fillings put in with that palladium have been exceedingly imperfect, although they have been put in with all the care that I could exercise. I had in view that I should look at it afterwards as an experiment, so that I finished the edges with all the care I could bestow upon them. The palladium left in my hands is more or less plastic, but not of course as plastic as at the time when it was put in. The burnisher made a considerable impression on the surface, and the fillings so inserted and finished a day or two afterwards were very unsatisfactory. The edges were very rough, and I could put a fine pointed instrument by the side of the edge of one of them as if it had curled up.

Mr. Hutchinson.—In using palladium I have noticed very strongly what Mr. Makins has said about the different degrees of fineness or coarseness. Where it is a very thin almost impalpable powder, there is much difficulty in mixing it. One point I am convinced has a great influence

on the result in the use of palladium. That is the pureness of the mercury. I have sent to the chemist to get what they call pure mercury, and in using it I have found that the palladium did not amalgamate at all readily. I then got some of what is technically called "double distilled mercury" from one of the depôts and on using it with precisely the same palladium it mixed with perfect readiness. I do not say that it was not pure mercury that I got from the chemist, but certainly it was not as pure as that from the depôt. Therefore I am convinced that the comparative impurity had something to do with the non-amalgamation. Unfortunately I have been more fortunate than Mr. Makins in seeing these explosions; and I have noticed this fact, that when the palladium after being mixed in the palm of the hand, or in an agate mortar, was laid on a piece of cloth, or silk, or leather, an explosion instantly took place; whereas if the same palladium, mixed with nearly the same amount of mercury, was kept on the hand until it was put in the tooth I have not seen an explosion occur. I have never seen an explosion in my hand or in anyone else's hand, but I have frequently seen it when the palladium has been laid on a cloth. I wrote to Messrs. Johnson & Matthey to ask them if they could explain it, and they replied to me saying that it was owing to an excess of hydrogen in the palladium, and that if I heated it before using it to drive off the hydrogen the explosion would not take place. They also said that I might let the explosions occur, then collect the pieces and add more mercury.

Mr. Makins.—Mr. Hutchinson's experience with regard to the effect of leather or cloth is new to me. I have also used both in my operations. He is quite correct, however, as to the question of pure mercury. I believe it has a great effect upon the amalgamation. You cannot get a good amalgam with impure mercury; but mercury is so easily purified that it is the practitioner's fault if he uses it in the impure state.

The President.—I should like to ask Mr. Makins if he would still further explain what he means by "the very

careful manipulation" which he says is necessary to avoid explosion. I ask the question from an interested motive. I was really induced to abandon the use of palladium at one time because it was so extremely troublesome to mix it with the mercury. The late Mr. Rogers used it pretty consistently, but his method was to use a Wedgwood mortar, and get the amalgam thoroughly rubbed into the pores of the mortar: he never cleared it off absolutely, but simply wiped the mortar, leaving a coating of the old amalgam over the surface; in that way he was able to get the mercury and palladium to mix. But even with him it was often a matter of very great trouble.

Mr. Makins.—I think Mr. Rogers simply got a rough surface, and by that means he kept constantly fresh surfaces of the palladium and mercury together. My exposition of the careful mixing is that you should keep the whole mass in constant motion, bringing the particles of palladium in contact with fresh portions of mercury until you get a pasty mass; then you should not condense it too quickly: and you have no occasion to bring it into a pellet or a ball such as I needed—it is those compact masses that generally explode more readily.

Mr. Coleman.—In preparing this amalgam it is common to commence by taking a certain quantity of palladium, and adding to it a certain quantity of mercury; but by commencing with mercury and adding palladium, dissolving, as it were, the palladium in the mercury, and adding the former until the requisite consistency has been obtained, I find I get a much more manageable mixture, and with greater economy, than by adding mercury to palladium and then squeezing out excess of mercury, containing, as has been stated, much palladium. I have a mortar, and I have tried it, but I find it easier to do it in the hand, and it appears to me to be quite as effective. I am not, I suppose, predisposed to ptyalism, but I have heard of several cases in which members think they have been salivated by adopting this plan.

Mr. Magor.—I think a great error is frequently made by mixing too much mercury with the metal,—whether palladium

or anything else. The chief object should be to combine the filings, and I think the larger these are the better. Just as we should join two pieces of metal together by soldering, so should we consider that we have a large number of small pieces of metal to be joined together, on the same principle, by mercury. The amalgam should be, according to my experience, in a very stiff, crumbly paste, which should be *well* pressed into the cavity, when the mercury will unite the filings and there will be no alteration afterwards. When I went into the country, more than thirty years ago, I made up my mind to use nothing but gold for stopping teeth with. I, however, soon found out that there were large numbers of teeth which I could not, without putting my patient to great expense and an undue trial of patience, stop with gold. So I turned my attention to amalgams, and only on Saturday week a lady showed me a tooth which she assured me I had stopped more than twenty years ago with amalgam, standing quite as firm as when put there. It has always been my plan to use a very small amount of mercury. Too much mercury leads to shrinking or altering of the mass afterwards.

Mr. Sewill.—I do not know whether it will be out of order to discuss the question of amalgams generally. If not I should like to ask Mr. Makins a question with regard to other amalgams. When we had the discussion on Mr. Tomes's paper there were many points unsettled which perhaps he might be able to throw light upon.

The President.—I think we had better finish discussing the palladium question first.

Mr. Moon.—With regard to the point mentioned by Mr. Coleman as to mixing the amalgam in the hand: for some months past I have noticed that, whenever I have handled an amalgam stopping or two during the day, I have invariably felt before the evening a tenderness of the gums. I should not therefore advise all members of the Society to follow Mr. Coleman's advice in this respect. The matter is of importance to us all; it is a kind of thing that would go on insidiously, and

the frequent inunction of small quantities of mercury might affect a man's health considerably.

Mr. Dennant.—Following up Mr. Hutchinson's remark with regard to the purchasing of mercury from chemists, I feel bound to offer a word of warning, because I have rarely met with a pure sample from a chemist's shop. I have taken a great deal of trouble to distil mercury, and nearly every sample I have received has been very impure, the mercury of commerce being largely adulterated with zinc, bismuth, antimony, lead, &c.; but the samples I have procured from the depôts, with one or two exceptions, have invariably turned out well. I think it would be a great mistake if any gentleman should fall into the habit of getting supplied from the chemists, unless it were specially prepared for his use.

Mr. Turner.—I should like to ask Mr. Makins if he has used any other metals as alloys along with palladium.

Mr. Makins.—No, I have not; I have done very little in that way. These experiments I have gone into *con amore*, because I was persuaded that many of these amalgams were atomic. I was convinced in very early days amongst you of the uselessness of so many of the amalgams. But I think you owe a great deal to Mr. Fletcher for the way in which he has worked out many of his exceedingly clever combinations. Some of them are thoroughly practical, at least if one may trust the tubes I have had from him, many of them standing the test of time exceedingly well as to shrinkage and so on. And he has done good service in drawing attention to the subject, as the experiments of my colleague, Mr. Tomes, and of others show.

Mr. C. Tomes.—I have mixed palladium with mercury in which a certain portion of gold had been dissolved, with a view of seeing whether gold would diminish the discoloration, or otherwise affect the palladium. You may add some little quantity of gold without in the slightest degree affecting the discoloration. I have put in some plugs of palladium amalgam to which I added some gold, and they are as black as ink.

The following letter on Mr. Fletcher's platinum amalgam was read :—

"15, Suez-street, Warrington,
May 20, 1875.

"Dear Sir,—With reference to the experiments made by Mr. Tomes and Mr. Ewbank on my platinum amalgam, will you please lay the enclosed plugs before the Odontological Society. I have copied Mr. Tomes's conditions, except that I have used ivory, as such large cavities are rarely to be obtained in natural teeth with the remaining walls impervious to Draper's ink. The plug No. 1 was inserted by myself, the cavity being such as to prevent fair plugging or wedging. The one marked 2 was inserted by one of my workmen, who knows nothing whatever of filling. My own plug is a sound one, although it was left in the ink for thirty hours. No. 2 is imperfect through careless and improper manipulation, but I believe it would have been perfectly tight against any ordinary ink. The small piece on the bottom was an attempt to pack on a flat surface with a very dry amalgam, and is a partial success—contrary to my expectations.

"It appears to me that Mr. Tomes's failure was caused either by using teeth which were not themselves impervious to moisture, or that he disturbed his plugs in an attempt to make prominent contours, which can only be done by the use of very plastic amalgam.

"Some of the members questioned my statements as to cohesive gold and the value of hemispherical pluggers. I enclose a cavity, which I filled with S. S. White's extra cohesive foil, using a large bur-head plugger and hand-pressure only. The base was made of an old cohesive plug, fitting loosely, and being quite unsteady under the plugger. This base weighed twelve grains, the finished plug weighed twenty-five grains, and the whole time expended in preparing the gold and filling was under ten minutes. The result being a fairly tight plug. I do not wish to recommend this style of work by any means, but I can safely say that with any other form of plugger I could not have obtained equal results with less than about two

hours' hard work, if I did not fail totally. I think that pluggers of this form cannot be too strongly recommended to the profession for cohesive gold working.—" Faithfully,

" THOS. FLETCHER."

Mr. C. TOMES.—As my name has been brought up in connection with this subject, and as Mr. Ewbank is not here, I should like to say a word or two in answer to Mr. Fletcher's letter. We intentionally selected *teeth* in all instances for our experiments. We did not make hemispherical holes in pieces of ivory, but we selected teeth, and in almost all instances teeth with difficult cavities. Having failed with these difficult cavities, in some cases we tried easier ones, but our failures were uniform. It was not from any want of careful manipulation, for Mr. Ewbank's failures were as complete as mine. We tried the amalgam in every conceivable condition of dryness, as we stated in the papers. Mr. Fletcher tells us that we are to make watertight fillings; then he complains of Draper's ink as being a too penetrating fluid and too severe a test. Now, why should Draper's ink be more penetrating than water? It may be more penetrating than other colouring fluids with solid particles in suspension; but, after all, our object is not to make ink-tight plugs in the mouth, but water-tight plugs, and there is no reason why Draper's ink should be able to go where water cannot. I do not think that any one is justified in saying that Draper's ink, which is undoubtedly a severe test, is too severe a test for that one matter of water-tightness. But the point which specially calls for comment is that we in all cases selected teeth, the teeth, and not glass tubes nor pieces of solid ivory, being the things in which we have to make water-tight fillings; and in the majority of instances when we use amalgam at all we have to fill difficult cavities, more or less contour cavities. We did not make contour fillings in the sense that Mr. Fletcher thinks. We selected bad cavities, and making a plug of even and smooth surface, it is necessary to carry it out a little beyond the surface of the tooth in certain places. But when we had failed in such cavities as those, we almost always took simpler ones, and then we generally failed again. Against

that I should say that with palladium we had uniform success to report; also with Mr. Fletcher's expanding amalgam, which he, on other grounds, now seems to condemn,—at least he does not advocate its use.

Mr. TURNER.—I was an unwilling experimenter a short time ago in the matter relating to Mr. Fletcher's platinum and gold amalgam. I had occasion to remove a plug of this material which I had inserted: I removed one half of it, and cleared out the cavity entirely, so that I could get readily at the pulp-cavity of the tooth. The tooth was perfectly dry, and the cavity quite as I should wish to see it after withdrawing the plug for an experiment. The other half of the plug remained *in situ*, and refused to move. If I had wished to remove it I should have had to cut it away piece by piece as I had cut the first half. I think that says a great deal for the stopping. When I use Mr. Fletcher's platinum and gold amalgam, I try to follow the conditions which he asks us to follow. I not only have the cavity as dry as it can be made, but I keep it so. Whenever I use this kind of stopping I use the rubber dam, and thereby I get a dry cavity, and I keep the stopping dry as long as possible after it has been inserted. The plug I refer to had been treated in this manner, and when I had unwillingly to cut away half of it, I was gratified with the result so far as the success of the plug itself was concerned.

Mr. MAKINS.—I have on the table some fine specimens, kindly sent for me by Messrs. Johnson & Matthey;—one of sponge palladium as first reduced. The value of this partially fused mass is considerably above a thousand pounds; it has been patiently separated from an immense amount of platinum ore. Here are also pure palladium in wire and sheet; and a tube of pure metal weighing over nineteen ounces: it was made for Deville's gas experiments. Lastly, some palladium spring wire, of an alloy of palladium with silver and copper, which gives a most elastic spring; and two specimens of Brazilian gold containing palladium.

The PRESIDENT.—I now return thanks to the authors of the

several communications and adjourn the meeting, bidding you good-bye for the season. I wish you good cheer, and hope that we may all meet again in November in health and vigour fully prepared to enter upon a new session.

The meeting was then adjourned to Monday, November 1st.

"*To the Editor of the Transactions of the Odontological Society.*

"DEAR SIR,—Since the last meeting of the Society I have seen the patient whose case I then described, and put to her the following queries, which, with the replies, are of such importance that I think it desirable they should be inserted in a note to the Transactions.—Yours truly,

"ALFRED COLEMAN."

"*Q.* What, in your opinion, was the cause of the pain and loss of sight in your eye?

"*Ans.* Oh! my tooth.

"*Q.* Why?

"*Ans.* Because when it was taken out my eye at once got better.

"*Q.* How do you mean, got better?

"*Ans.* Why, the pain almost immediately ceased, and the sight returned.

"*Q.* But, did you not say the loss of vision increased for a few days after the tooth was removed?

"*Ans.* I am not aware I said so; I did not intend to convey that impression.

[From the above reply, she evidently had given Mr. Bennett a wrong impression respecting the increased loss of vision after the extraction of the tooth.—A. C.]

"*Q.* But did the sight become worse after the removal of the tooth?

"*Ans.* I cannot tell, as I could not see at all, when the tooth was taken out."

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